

REC'D 1981

Catalog 93

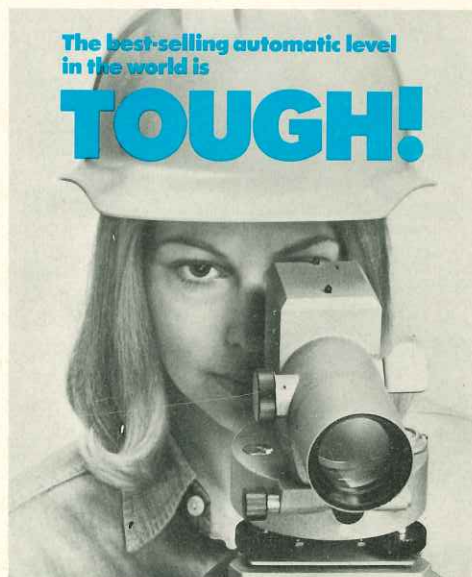
FROM SESCO ENVELOPE

MR. BASS

PUBLISHED
1975

LIETZ

Surveying Instruments and Equipment



Features of Lietz Theodolites

Telescope:

28X achromatic optics for adequate distance viewing capability with excellent light gathering qualities. 2.5 to 3 second resolving power means you can see what you're looking at. Short minimum focus distance facilitates work in tight spaces. Accepts most scope-mounted EDM systems. Axis has cylindrical bearings to withstand years of tough field use.

Vertical Circle:

Precision engraved on highest grade optical glass. Rugged and precise automatic indexing for fast, efficient field use. A great timesaver with less chance for operator error.

Compass:

Detachable trough compass furnished with each theodolite (except Model TM-1A) at no extra charge.

Circle Illumination Source:

Single reflecting mirror illuminates all internal readings. A small battery powered light pack supplied with each instrument at no extra charge, conveniently clips on to provide artificial illumination when needed.

Circle Positioning Ring:

Allows quick pre-setting of any desired horizontal circle reading. (Model TM-1A theodolite has protected control knob).

Focus Ring:

For fast one-hand sighting and pointing.

Circle Readout:

Both vertical and horizontal circles are easily read through a convenient microscope located adjacent to telescope eyepiece. Another timesaving feature which also provides less operator fatigue.

Optical Plummet:

Located in upper section (alidade) so it rotates with instrument to insure precise positioning.

Horizontal Motion Controls

Detachable Tribach:

All Lietz theodolites detach from leveling base (tribach) to provide a quick and easy method for positioning electronic distance measuring devices, traverse equipment and many other accessory items by use of tribach adapters. Lietz tribachs are compatible with Wild-Heerbrugg equipment.

SUPERB QUALITY

All Lietz theodolites are manufactured under exact requirements in one of the most modern factories in the world. For 93 years, the Lietz name has been synonymous with precision and quality in engineering equipment. We back up that reputation with the strongest guarantee in our industry.

GUARANTEE

Lietz Surveying Instruments are fully guaranteed against defects in workmanship or materials for the life of the instruments. The experience and reputation of the Lietz Company in the manufacture of precision equipment since 1882 stand behind this guarantee.

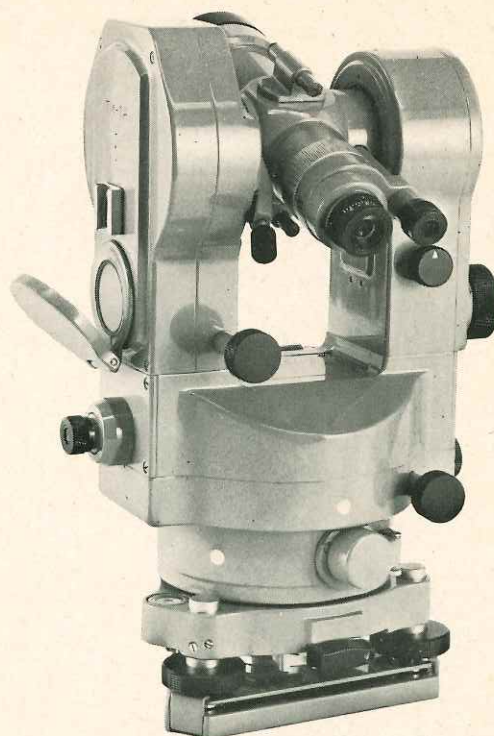


One Second Theodolite No. TM-1A

The perfect companion to your EDM (electronic distance measuring) system. Superbly designed and built. New techniques are used to produce a highly precise, easy to use instrument with features not found on any other similar equipment. For use in second order precision surveys of all types. Ideal for triangulation, astronomical determination and precise traversing.

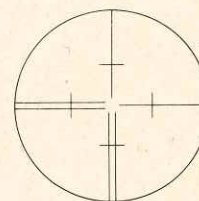
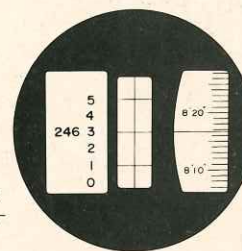
FEATURES:

- Circles engraved by special equipment to an accuracy of 0.2 seconds of arc.
- Centers accurate to ± 1 second to insure angle repeatability.
- Both horizontal and vertical circle graduations are displayed by means of a special patented method known as "co-incident image projection". This method employs the technique of projecting opposite side circle readings into the readout through a special prism thereby assuring optimum and equal light intensity and entirely eliminating parallax. Circle graduations, index line and micrometer graduations are thus displayed within an accuracy of 0.5 seconds of arc.
- Instrument is specially sealed against dust and moisture intrusion.
- Automatic indexing of the vertical circle.
- Dual sighting collimators mounted on telescope for quick pointing.
- Optical plummet mounted in alidade section of the instrument to insure precise positioning.
- Instrument detaches from its tribrach to allow direct installation of electronic measuring equipment.



Stock No. 7312-00 Instrument only Each,

246° 30'
8' 16.7"
246° 38' 16.7"



Reticle supplied

Telescope:

6.9 inches (175 mm) achromatic; internal focusing using spiral cut land and groove system. Erect image; reversible in both directions and balanced on axis. 28X magnification resolving to 2.5 seconds of arc. Eyepiece equipped with reset scale. Minimum focus 7.2 feet (2.2 m). Objective aperture 1.6 inches (40 mm). Field of view 1 degree 20 minutes (23 feet at 1000 feet). Steel telescope axis with cylindrical bearings. All lens surfaces coated. Dual sighting collimators.

Standards:

Special hardened alloy.

Reticle:

Glass, etched (Type D) stadia ratio 1:100. Stadia lines are short to distinguish them from cross line.

Horizontal Circle:

3.70 inch (94 mm) diameter glass circle graduated to 20 minutes. Micrometer reading direct to one second. Circle is numbered 0 to 360 degrees. Protected control knob for positioning circle to any desired reading.

Vertical Circle:

3.15 inch (80 mm) diameter glass circle graduated to 20 minutes. Micrometer reading direct to one second. Circle is numbered 0 to 360 degrees with 0 at zenith, 90 degrees and 270 degrees at the horizontal position. Automatic vertical circle indexing, magnetically damped. Indexing compensator range ± 2 minutes, setting accuracy ± 0.3 second.

Level Vials:

Circular bubble built into tribrach with sensitivity 10 minutes per 2 mm. Plate level vial sensitivity 20 seconds per 2 mm.

Optical Plummet:

2x magnification with cross line target reticle. Located in the alidade so that it rotates with the instrument. Erect image. Adjustable objective focus by push-pull slide motion. Focusing range 1.5 feet to infinity. (0.5 meters to ∞)

Instrument Base:

Detachable tribrach with $\frac{5}{8}$ x 11 thread. Instrument is secured to tribrach by swivel clamp. Three dust-protected leveling screws. Built-in circular level on tribrach. Refer elsewhere in this catalog for additional information on tribrachs.

Center:

Hardened steel cylindrical center with tapered thrust bearings to insure centering of vertical spindle.

Finish:

Gray enamel.

Equipment:

Hermetically sealed carrying case complete with back packing straps, plumb bob, night illumination battery pack, adjusting pin, dust cap, lens brush, sunshade, screwdriver, plastic rain cover and instruction book. Refer to accessory listings for optional equipment.

Weight:

Instrument only 13 lbs. (6 Kg.)
Case only 6.5 lbs. (3 Kg.)

Tripod:

Recommended for use with this instrument (not included in price):
No. 7512-50 Wide Frame Extension Leg $\frac{5}{8}$ x 11 thread.



Repeating Theodolite No. TM-10C

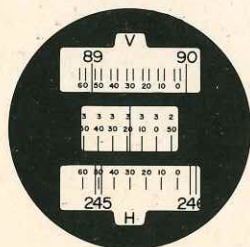
For triangulation and traverse work requiring higher precision than that afforded by the Lietz TM-20C Theodolite this instrument readily fills the need.

Both vertical and horizontal circles are displayed simultaneously through a microscope adjacent to the telescope eyepiece.

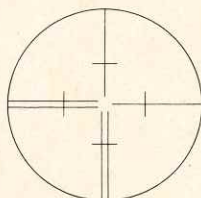
Vertical and horizontal angles are read directly to 10 seconds with estimation to 1 second. *Horizontal circle readings are projected from opposite sides of the circle thus each reading is the mean value of two diametrically opposite graduations to eliminate eccentricity error.*

Equipped with automatic vertical circle indexing to insure fast and accurate operation.

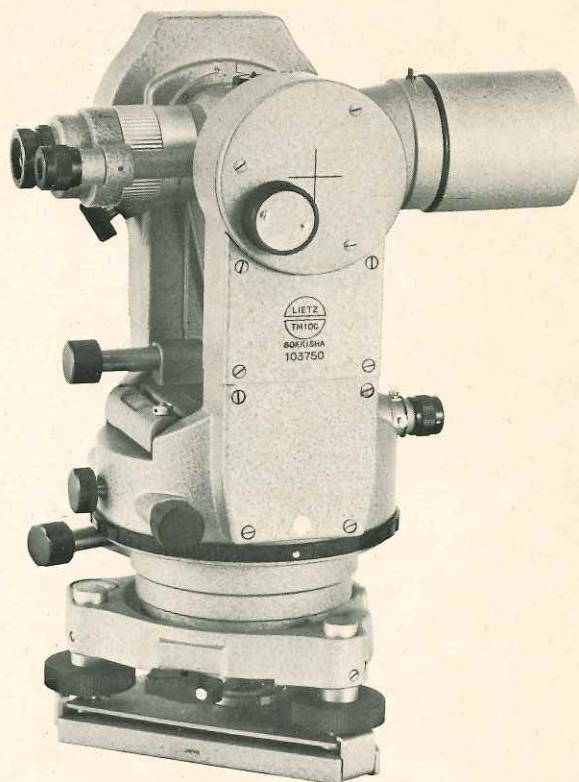
A small illumination battery pack, as standard equipment, attaches quickly to the instrument when poor lighting conditions prevail.



H 245° 50'
3' 18"
245° 53' 18''



Reticle supplied



Stock No. 7312-10 Instrument only Each,

Telescope:

6.9 inches (175 mm.), achromatic; internal focusing using spiral cut land and groove system. Erect image; reversible in both directions and balanced on axis. 28X magnification resolving to 3 seconds of arc. Minimum focus 4½ feet (1.3 m.). Objective aperture 1.6 inches (40 mm.). Field of view 1 degree 20 minutes (23 feet at 1000 feet). Bronze telescope axis with cylindrical bearings. All lens surfaces coated except first and last.

Reticle:

Glass, etched (type D), stadia ratio 1:100. Constant is 0. Stadia lines are short to distinguish them from cross lines.

Standards:

Special hardened alloy.

Horizontal Circle:

3.15-inch (80 mm.) diameter glass circle graduated to 1 degree. Micrometer scale reads direct to 10 seconds, with estimation to 1 second. Circle is numbered 0-360 degrees and can be positioned to any desired angle by means of an external ring.

Vertical Circle:

2.75-inch (70 mm.) diameter glass circle graduated to 1 degree. Micrometer scale reads direct to 10 seconds, with estimation to 1 second. Circle is numbered 0-360 degrees with 0 at zenith, 90 degrees and 270 degrees at horizontal position. Automatic vertical circle indexing. Indexing compensator range ±5 minutes, setting accuracy ±0.5 second.

Optical Reading System:

Both horizontal and vertical readings are carried through a completely enclosed system of prisms and lenses to a reading microscope located adjacent to the eyepiece of the telescope. Both circle readings and the micrometer scale are viewed simultaneously.

Level Vials:

Sensitivity of plate level vial 30 seconds per 2 mm. Sensitivity of circular level vial 10 minutes per 2 mm.

Optical Plummet:

2x magnification with cross line target reticle. Located in the alidade so that it rotates with the instrument. Erect image. Focusing range 1.5 to 15 feet (0.5 to 3 meters).

Instrument Base:

Detachable tribrach with ⅝ x 11 thread. Instrument is secured to tribrach by swivel clamp. Three dust-protected leveling screws. Built-in circular level on tribrach. Refer elsewhere in this catalog for additional information on tribrachs.

Centers:

Hardened steel cylindrical centers with tapered thrust bearings, to insure centering of vertical spindle.

Finish:

Gray enamel.

Equipment:

Hermetically sealed carrying case complete with back packing straps, plumb bob, trough compass, night illumination battery pack, adjusting pin, dust cap, dust brush, sunshade, screwdriver, plastic rain hood and instruction book. Refer to accessory listings for optional equipment.

Weight:

Instrument only — 11 lbs. (5 Kg.) Case only — 6.5 lbs. (3 Kg.)

Shipping weight — 23 lbs. (10.4 Kg.)

Tripods:

Recommended for use with this instrument (not included in price):

No. 7512-50 Wide Frame Extension Leg (Wood).

No. 7536-75 Wide Frame Extension Leg (Aluminum).



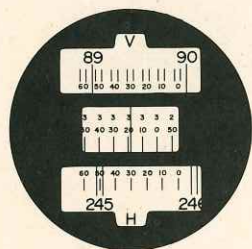
Double Center Theodolite No. TM-20C

The TM-20C Theodolite has a remarkably accurate optical system. Ultra-fine graduations on glass are carried optically to the reading microscope located adjacent to the telescope eyepiece thus allowing for precision and speed of readings. Both horizontal and vertical circles are viewed at the same time. The micrometer window separates the horizontal and vertical windows to minimize possibility of error and simplify reading angles.

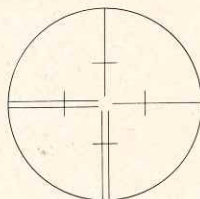
The sum of the circle reading and micrometer reading is displayed directly to 20 seconds and by estimation to 3 seconds. *The horizontal angle reading is the mean of graduations on opposite sides of the circle, thus eliminating any eccentricity error in the circle.*

The vertical circle is automatically indexed by means of a wire suspended air dampened compensator, thus eliminating the need for a level vial on the standards.

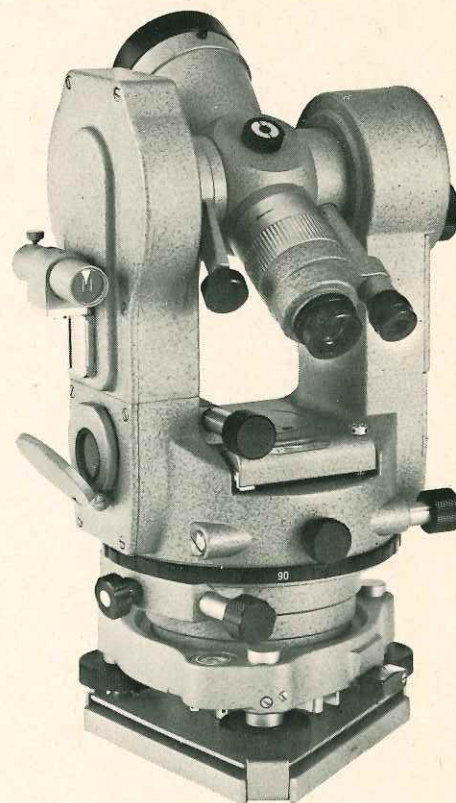
A small illumination battery pack, as standard equipment, attaches quickly to the instrument when poor lighting conditions prevail.



H 245° 50'
3' 18"
245° 53' 18"



Reticle supplied



Stock No. 7312-20 Instrument only . . . Each,

Telescope:

6.9 inches (175 mm.), achromatic; internal focusing using spiral cut land and groove system. Erect image; reversible in both directions and balanced on axis. 28X magnification resolving to 3 seconds of arc. Minimum focus 4¼ feet (1.3 m.). Objective aperture 1.6 inches (40 mm.). Field of view 1 degree 20 minutes (23 feet at 1000 feet). Bronze telescope axis with cylindrical bearings. All lens surfaces coated except first and last.

Reticle:

Glass, etched (type D), stadia ratio 1:100. Constant is 0. Stadia lines are short to distinguish them from cross lines.

Standards:

Special hardened alloy.

Horizontal Circle:

3.15-inch (80 mm.) diameter glass circle graduated to 1 degree. Micrometer scale reads direct to 20 seconds, with estimation to 3 seconds. Circle is numbered 0-360 degrees and can be positioned to any desired angle by means of an external ring.

Vertical Circle:

2.75-inch (70 mm.) diameter glass circle graduated to 1 degree. Micrometer scale reads direct to 20 seconds, with estimation to 3 seconds. Circle is numbered 0-360 degrees with 0 at zenith, 90 degrees and 270 degrees at horizontal position. Automatic vertical circle indexing. Indexing compensator range ± 5 minutes, setting accuracy ± 0.5 second.

Optical Reading System:

Both horizontal and vertical circle readings are carried through a completely enclosed system of prisms and lenses to a reading microscope located adjacent to the eyepiece of the telescope. Both circle readings and the micrometer scale are viewed simultaneously.

Level Vials:

Sensitivity of plate level vial 30 seconds per 2 mm. Sensitivity of circular level vial 10 minutes per 2 mm.

Optical Plummet:

2x magnification with cross line target reticle. Located in the alidade so that it rotates with the instrument. Erect image. Focusing range 1.5 to 15 feet (0.5 to 3 meters).

Instrument Base:

Detachable tribrach with 5/8 x 11 thread. Instrument is secured to tribrach by swivel clamp. Three dust-protected leveling screws. Built-in circular level on tribrach. Refer elsewhere in this catalog for additional information on tribrachs.

Centers:

Hardened steel cylindrical centers with tapered thrust bearings, to insure centering of vertical spindle.

Finish:

Gray enamel.

Equipment:

Hermetically sealed carrying case complete with back packing straps, plumb bob, trough compass, night illumination battery pack, adjusting pin, dust cap, dust brush, sunshade, screwdriver, plastic rain hood and instruction book. Refer to accessory listings for optional equipment.

Weight:

Instrument only — 11 lbs. (5 Kg.) Case only — 6.5 lbs. (3 Kg.)
Shipping weight — 23 lbs. (10.4 Kg.)

Tripods:

Recommended for use with this instrument (not included in price):
No. 7512-50 Wide Frame Extension Leg (Wood).
No. 7536-75 Wide Frame Extension Leg (Aluminum).



Optical Scale Double-Center Theodolite No. T-60D

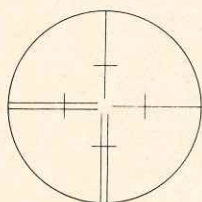
The T-60D Theodolite is designed to replace the conventional transit. This excellent instrument will speed up any construction surveying job. It is ideally suited to work which involves turning deflection angles to the left and right.

Both horizontal and vertical angles are simultaneously displayed on a scale, thereby eliminating the need for verniers or a micrometer while at the same time providing precision and speed of operation. Each angle is read directly to one minute with estimation to tenths of a minute.

The horizontal circle is double numbered. Two full rows of figures are displayed, 0-360° clockwise and counter-clockwise.

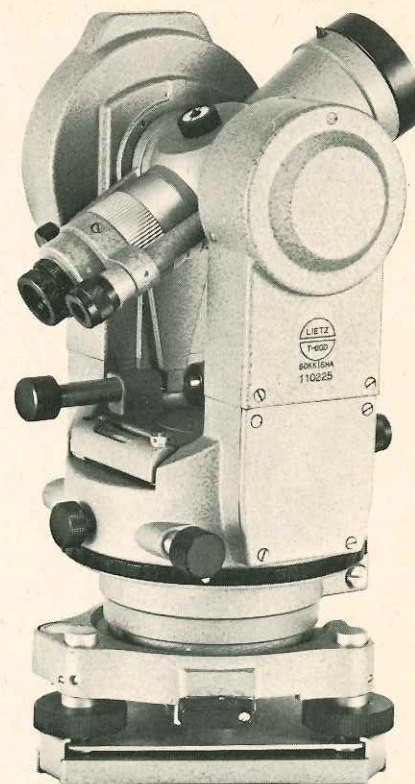
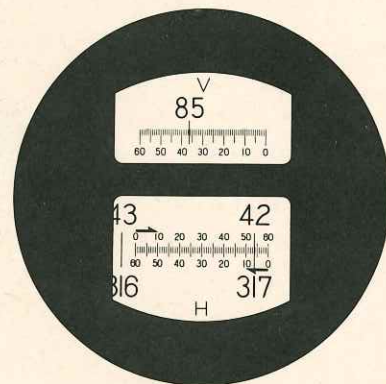
An air-dampened, wire-suspended compensator is incorporated with the vertical circle to provide automatic indexing. This feature eliminates the need for level vials on the standards and is a great operational time saver.

A small illumination battery pack, as standard equipment, attaches quickly to the instrument when poor lighting conditions prevail.



Reticle supplied

V 85°
36.3'
85°36.3'
H 42°
53.8'
42°53.8'
317°
6.2'
317°6.2'



Stock No. 7312-60 Instrument only Each,

Telescope:

6.9 inches (175 mm.), achromatic; internal focusing using spiral cut land and groove system. Erect image; reversible in both directions and balanced on axis. 28X magnification resolving to 3 seconds of arc. Minimum focus 4¼ feet (1.3 m.). Objective aperture 1.6 inches (40 mm.). Field of view 1 degree 20 minutes (23 feet at 1000 feet). Bronze telescope axis with cylindrical bearings. All lens surfaces coated except first and last.

Reticle:

Glass, etched (type D), stadia ratio 1:100. Constant is 0. Stadia lines are short to distinguish them from cross lines.

Standards:

Special hardened alloy.

Horizontal Circle:

3.75-inch (95 mm.) diameter glass circle graduated to 1 degree. Microscale reads direct to 1 minute with estimation to tenths of a minute. Circle is double-numbered 0-360 degrees, clockwise and counterclockwise, and can be positioned to any desired angle by means of an external ring.

Vertical Circle:

3.54-inch (90 mm.) diameter glass circle graduated to 1 degree. Microscale reads direct to 1 minute with estimation to tenths of a minute. Circle is numbered 0-360 degrees with 0 at zenith, 90 degrees and 270 degrees at horizontal position. Automatic vertical circle indexing. Indexing compensator range ± 5 minutes, setting accuracy ± 0.5 second.

Optical Reading System:

Both horizontal and vertical circle readings are carried through a completely enclosed system of prisms and lenses to a reading microscope located adjacent to the eyepiece of the telescope. Both circle readings and the microscale are viewed simultaneously.

Level Vials:

Sensitivity of plate level vial 30 seconds per 2 mm. Sensitivity of circular level vial 10 minutes per 2 mm.

Optical Plummet:

2x magnification with cross line target reticle. Located in the alidade so that it rotates with the instrument. Erect image. Focusing range 1.5 to 15 feet (0.5 to 3 meters).

Instrument Base:

Detachable tribrach with 5/8 x 11 thread. Instrument is secured to tribrach by swivel clamp. Three dust-protected leveling screws. Built-in circular level on tribrach. Refer elsewhere in this catalog for additional information on tribrachs.

Centers:

Hardened steel cylindrical centers with tapered thrust bearings, to insure centering of vertical spindle.

Finish:

Gray enamel.

Equipment:

Hermetically sealed carrying case complete with back packing straps, plumb bob, trough compass, night illumination battery pack, adjusting pin, dust cap, dust brush, sunshade, screwdriver, plastic rain hood and instruction book. Refer to accessory listings for optional equipment.

Weight:

Instrument only — 11 lbs. (5 Kg.) Case only — 6.5 lbs. (3 Kg.)
Shipping weight — 23 lbs. (10.4 Kg.)

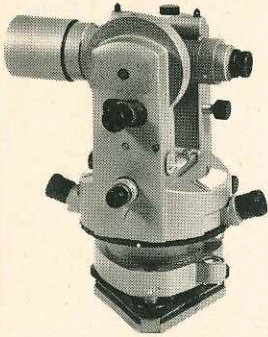
Tripods:

Recommended for use with this instrument (not included in price):
No. 7512-50 Wide Frame Extension Leg (Wood).
No. 7536-75 Wide Frame Extension Leg (Aluminum).



Optical Transit No. 10-C

The finest optics and engineering are combined in this all-purpose instrument built to last a lifetime.

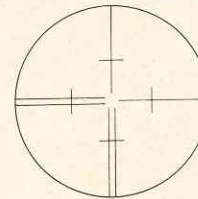
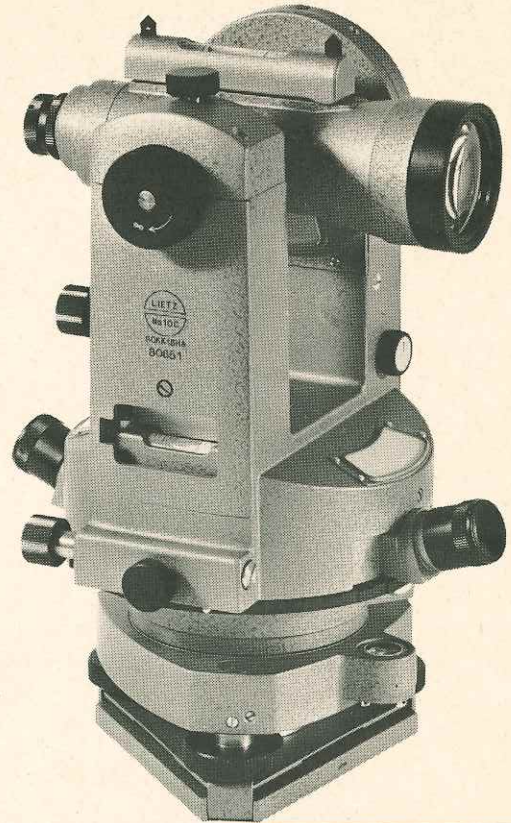


Glass circles and verniers are back-lighted to provide a startlingly bright and easy-to-read index. A high degree of accuracy is further assured by means of the optical-reading microscopes that eliminate parallax and give rapid reading to 20 seconds on the horizontal circle. Maximum protection is provided against dust intrusion into component parts of the instrument.

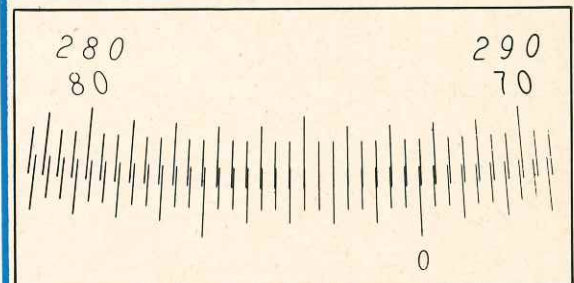
A built-in optical plummet speeds the setting-up process under any weather conditions.

Stock No. 7321-20 Instrument only Each,

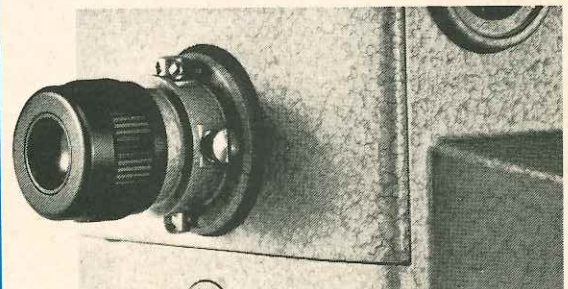
- Telescope:** 6.9 inches (175 MM) achromatic, internal focusing with straight cut rack and pinion. Erect image; reversible in both directions and balanced on axis. 28X magnification resolving to 3 seconds of arc. Minimum focus $4\frac{1}{4}$ feet (1.3 M). Objective effective aperture 1.6 inches (40 mm). Field of view 1 degree 20 minutes. Bronze telescope axis with cylindrical bearings. All lens surfaces coated except first and last.
- Reticle:** Glass, etched (type D) stadia ratio 1:100. Constant is 0. Stadia lines are short to distinguish them from cross lines.
- Levels:** Telescope — 2.25 inches with sensitivity 40 seconds per 2 mm. Plate — 1.5 inch with sensitivity 90 seconds per 2 mm. Circular bubble in base with sensitivity 10 minutes per 2mm.
- Standards:** Special hardened alloy.
- Vertical Circle:** 2.68-inch (68 mm) diameter with graduations on glass divided to 30 minutes. Numbered in quadrants. Glass vernier direct coincidence reading to 1 minute is backlit through frosted glass and viewed through mounted magnifier to provide clear and accurate reading. (Stadia circle available at extra cost.)
- Horizontal Circle:** 4.33-inch (110 MM) diameter with graduations on glass divided to 20 minutes. Double numbered 0-360 and 360-0 with figures inclined in direction of increase. Two glass verniers direct coincidence reading to 20 seconds. Verniers are read through permanently attached 7X prismatic magnifiers. Illumination through frosted glass provides utmost definition and accuracy. Circle may be positioned to any desired angle by means of an external ring.
- Compass:** Trough type, located in standard.
- Center:** Hard-bronze alloy, specially-aged, hand-fitted for friction-free long wear.
- Optical Plummet:** 2x magnification with cross line target reticle. Located in the alidade so that it rotates with the instrument. Erect image. Adjustable objective focus by push-pull slide motion. Focusing range 1.5 to 50 feet (0.5 to 15 meters).
- Instrument Base:** Three replaceable leveling screws with dustproof covers. Design of leveling head allows $1\frac{1}{2}$ inch movement on tripod head with clamp below. Standard $\frac{5}{8}$ "x11 thread base plate. Built-in circular leveling vial.
- Finish:** Gray enamel.
- Equipment:** Hermetically-sealed case complete with back packing straps, plumb bob, adjusting pins, dust brush, screwdriver, instruction book and plastic rain hood. Refer to accessory listings for optional equipment.
- Weight:** Instrument only — $11\frac{1}{2}$ lbs. (5.2 Kg.) Case only — 6.5 lbs. (3 Kg.)
- TriPods:** Recommended for use with this instrument (not included in price):
No. 7512-50 Wide Frame Extension Leg (Wood).
No. 7536-75 Wide Frame Extension Leg (Aluminum).



Reticle supplied



Looking through horizontal circle magnifier to show ease of reading and accuracy attainable.



Built-in optical plummet saves time; provides greater accuracy and convenience.



BT Series Optical Plummet Transits

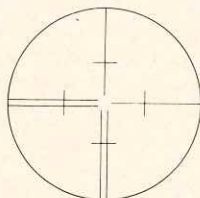
The finest quality instruments of this type available today. Solidly built to give years of trouble-free field performance.

A 28-power telescope, with 3-second resolving power, provides brilliant optics. The built-in optical plummet allows for rapid set-ups even in high winds or in areas around heavy equipment where excessive vibration exists.

Stock No. 7325-20 (BT-20) Instrument only, double-direct reading to 20 seconds Each,

Stock No. 7325-30 (BT-30) Instrument only, double-direct reading to 30 seconds Each,

Stock No. 7325-60 (BT-60) Instrument only, double-direct reading to 1 minute Each,



Reticle supplied

Telescope: 6.7 inches, (170 mm) achromatic, internal focusing with straight cut rack and pinion. Erect image; built-in sunshade; reversible in both directions and balanced on axis. 28X magnification resolving to 3 seconds of arc. Minimum focus $4\frac{1}{4}$ feet (1.3 m). Objective effective aperture 1.37 inches (35 mm.). Field of view 1 degree 10 minutes. Bronze telescope axis with cylindrical bearings. All lens surfaces coated except first and last.

Reticle: Glass, etched (type D) stadia ratio 1:100. Constant is 0. Stadia lines are short to distinguish them from cross lines.

Standards: Special hardened alloy.

Levels: Telescope — 2 inches with sensitivity 60 seconds per 2 mm.
Plate — 1 inch with sensitivity 90 seconds per 2 mm.
Circular vial for rough leveling with sensitivity 10 minutes per 2 mm.

Vertical Circle: 3.15-inch (80 mm) diameter graduated to 30 minutes on alloy with vernier reading to 1 minute.

Horizontal Circle: 4.75-inch (120 mm) diameter has graduations on alloy; two verniers on alloy double-direct reading to 20 seconds (BT-20), 30 seconds (BT-30) or 1 minute (BT-60). Circle may be positioned to any desired angle by means of an external ring.

Compass: Trough type, located in standard.

Center: Hard-bronze alloy, specially-aged, hand-fitted for friction-free long wear.

Optical Plummet: Cross hair target reticle located in the alidade so that it rotates with the instrument.

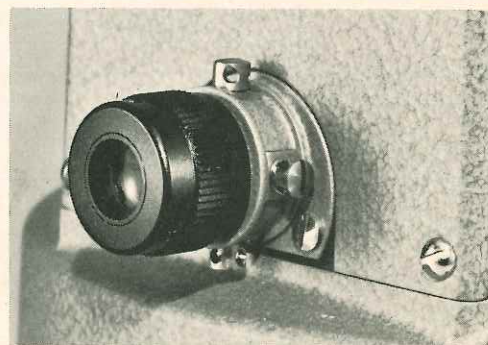
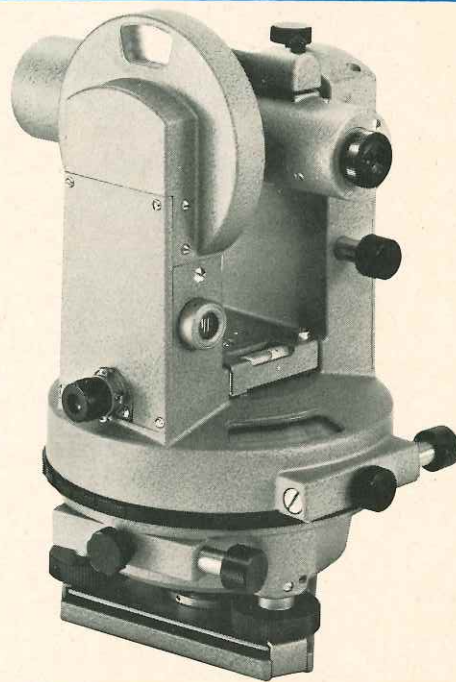
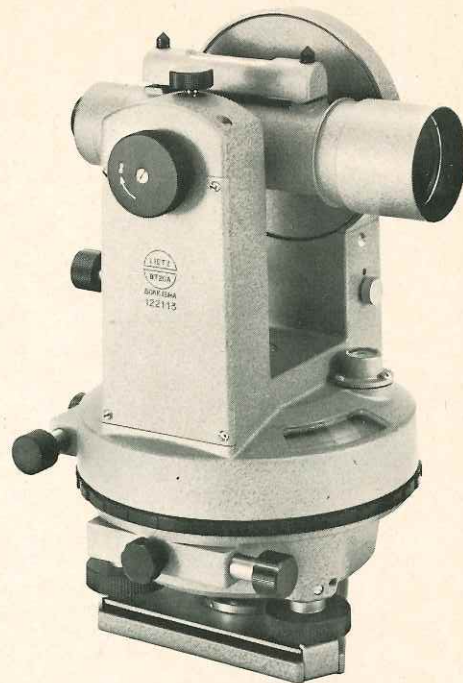
Construction: Three replaceable leveling screws with dustproof covers. Instrument can be rotated freely on its center or held firm in position with clamp screw. Design of leveling base allows $1\frac{1}{2}$ inch movement on tripod head with clamp below. Standard $\frac{5}{8}$ " x 11 thread base plate.

Finish: Gray enamel.

Equipment: Hermetically-sealed case complete with back packing straps, plumb bob, adjusting pins, dust brush, screwdriver, plastic rain hood and magnifying glass. Refer to accessory listings for optional equipment.

Weight: Instrument only — 10.1 lbs. (4.6 Kg.) Case only — 6.5 lbs. (3 Kg.)

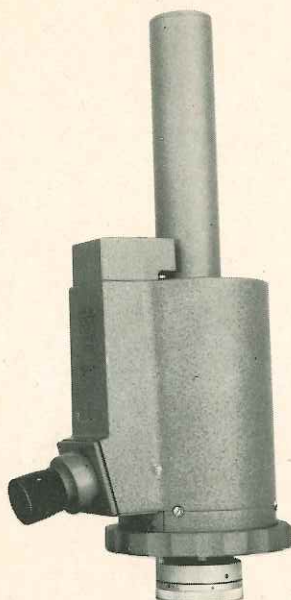
Tripods: Recommended for use with this instrument (not included in price):
No. 7536-75 Wide Frame Extension Leg. $\frac{5}{8}$ " x 11 thread.
All tripods described on pages immediately following instrument listings.



*Built-in optical plummet saves time;
provides greater accuracy and convenience.*



TM-20C Theodolite
(Modified)



Gyro Unit

The theodolite is only modified externally (above the standards). For basic specifications of the TM-20C Theodolite, please refer to Page 5.

Using the GP-1 North Seeking Gyro Attachment in combination with a Lietz theodolite, true north can be quickly and accurately determined to an accuracy of less than $\pm 30''$.

The Gyro Attachment operates completely free of external magnetic influence and is ideally suited for obtaining true north. A few of the many uses of the GP-1 are as follows:

- Underground construction in tunnels, mine shafts or within iron framed hulls
- Traversing where compasses are magnetically "blocked"
- With EDM systems in establishing reference bearings
- Directional determination and orientation of navigational devices, transmitters or antennae

The GP-1 is a pendulous gyro consisting of a wire-hung pendulum supporting a high speed, perfectly balanced gyro motor capable of attaining the required speed of 12,000 R.P.M. in 60 seconds.

It is compact, lightweight and is mounted above the standards on a TM-20C Theodolite on a bridge high enough to allow for transiting the telescope. With the gyro unit detached, the theodolite is completely functional for general surveying use.

As the gyro rotates on its own axis, an oscillating motion of the unit is observed in the plane 90° to the pendulum. This generated secondary motion is characterized as a "precession motion" and is caused by a combination of the earth's spinning motion and its gravitational pull. As the gyro oscillates around the earth's meridian in this precession movement, the direction of true north is determined by utilizing the horizontal circle of the theodolite to read both ends of the precession. The center of the precession is true north and the optical axis of the theodolite is coincident with the direction of the center of precession.

Stock No. 7305-00 Lietz Gyro System complete with TM-20C Theodolite . . . Each,



Technical Data

GYRO

Moment of inertia	1350 cm ² g
Angular momentum	1.6x10 ⁶ cm ² g/sec
Spin rate	Approx. 12,000 RPM
Running up time	Approx. 60 sec.
Half swing time at 35°N	Approx. 200 sec.
Determination accuracy	Less than $\pm 30''$
Weight	3.6 kg (8 lbs.)
Height	360 mm (14.2 inches)
Diameter	105 mm (4 inches)
Temperature range	-30° to +50°C
Power consumption	
running up	210 mA
measuring	60 mA

INVERTER

Input voltage	12V DC
Output voltage	115V AC 400 Hz.

BATTERY UNIT WITH CHARGER

Input voltage	115V 60 Hz.
Output voltage	12V DC
Capacitance	20 AH
Charging time	10 hours



Tripod recommended for use with this unit (not included in price)
7512-50

Equipment:

Complete Lietz/Sokkisha Gyro System consists of the following:

GP-1 NORTH SEEKING GYRO ATTACHMENT WITH TM-20C THEODOLITE* (modified at the factory) with bridge to fit GP-1 Gyro and standard instrument accessories for theodolite. Packed in a sturdy metal padded case with hinged top latches and with carrying handle. Weight: 17.3 kg (38 lbs.). Size: 55x43x25 cm (21¾x17x10 inches).

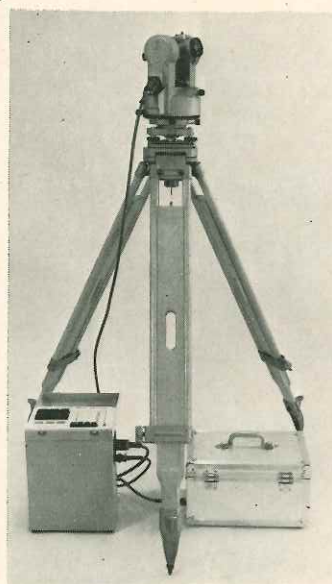
INVERTER in sturdy metal case with hinged top, latches and wide leather carrying strap. 5 M (16 ft) cable for connection to GP-1. Weight: 10 kg (22 lbs.). Size: 12x15x38 cm (8x6x15 inches).

BATTERY UNIT WITH CHARGER housed in sturdy metal case with snap locks, hinged top, and carrying handle. 3 M (10 ft) cable for connection to inverter. Weight: 14 kg (31 lbs.). Size: 34x22x21 cm (13½x8½x8 inches). Plus instruction manual, stop watch, two screwdrivers, two adjusting pins, tweezers, spare bulbs and miscellaneous accessories for operation of the system.

*Optional choice of TM-10C Theodolite available (also modified at factory) at corresponding price differential, available on special order.

APPLICATIONS

- Position determining of moving objects such as ships, balloons, military targets, etc.
- Deformation and movement studies of dams, bridges, structures, etc.
- Establishing ground or 3 dimensional coordinates (using 2 digital theodolites)



The Lietz/Sokkisha Digital Angle Measuring System satisfies a long awaited need of the surveying profession. Automatically and instantaneously horizontal and vertical angles are displayed electronically thus eliminating some of the difficulties in obtaining angular measurements through conventional optical reading by eye. An automated angle measuring system solves the problem of reading blunders and speeds up the entire process of angular measurement.

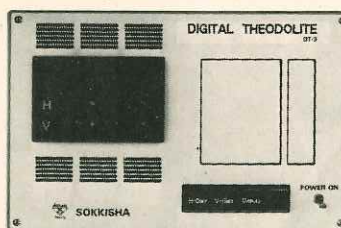
The development of a magnetic scale and sensing head by the Sony Magnascale Company and the application of this device by the Sokkisha Company to the Lietz/Sokkisha Theodolite provided the technological breakthrough necessary to produce this equipment.

Graduations are magnetically recorded around the Magnascale drum by a special dividing engine to an accuracy of 0.2" and are read or detected by the special sensing head. The drum is a circular plate made of non-magnetic material with its outer periphery superfinished to an extremely high degree of tolerance. On the superfinished surface a magnetic coating is applied with a square wave pattern magnetized onto the coating. Flux type magnetic sensing heads (multiple heads are used for increased accuracy) detect the drum graduations and through a series of electronic circuitry these pulses are counted and displayed instantaneously within the upper limit of the speed of angular rotation. Angles may be turned clockwise or counter-clockwise and the operation or readings are not affected by any external magnetic influence. Output from the control unit can be transformed to magnetic tape, paper tape printer or telemetering transmitter.

Standard digital angle measuring system consists of:

1. Digital theodolite (available in four models) in carrying case with accessories.
2. Control/display unit with LED readout, complete with connecting cable, in carrying case.
3. Power unit with built-in charger, complete with connecting cable, in carrying case.

Stock No. 7300-10 (DT- 3)		Each,
Stock No. 7300-20 (DT-15)		Each,
Stock No. 7300-30 (DT-30)		Each,
Stock No. 7300-40 (DT-60)		Each,



DT 3 Control/Display Unit

Telescope:

6.9 inches (175 mm.), achromatic; internal focusing using spiral cut lens and groove system. Erect image; reversible in both directions and balanced on axis. 28X magnification resolving to 3 seconds of arc. Minimum focus 4 1/4 feet (1.3 m.). Objective aperture 1.6 inches (40 mm.). Field of view 1 degree 20 minutes (23 feet at 1000 feet). Bronze telescope axis with cylindrical bearings. All lens surfaces coated except first and last.

Reticle:

Glass, etched (type D), stadia ratio 1:100. Constant is 0. Stadia lines are short to distinguish them from cross lines.

Minimum Circle Display:

	DT-3	DT-15	DT-30	DT-60
Horizontal	3"	15"	30"	1'
Vertical	6"	30"	1'	5'

Note: Option of 6" or 30" in both horizontal and vertical display and instruments with only one digitized circle are also available.

Level Vials:

Telescope — 2.25 inches with sensitivity 40 seconds per 2 mm. Plate — 1.5 inch with sensitivity 90 seconds per 2 mm. Circular bubble in base with sensitivity 10 minutes per 2 mm.

Optical Plummet:

Cross hair target reticle located in the alidade so that it rotates with the instrument.

Standards:

Special hardened alloy.

Instrument Base:

Detachable tribrach with 5/8 x 11 thread. Instrument is secured to tribrach by swivel clamp. Dust protected leveling screws. Built-in circular level on tribrach.

Centers:

Hardened steel cylindrical centers with tapered thrust bearings, to insure centering of vertical spindle.

Finish:

Gray enamel.

Power Consumption:

22.5 W

Power Unit w/ Charger:

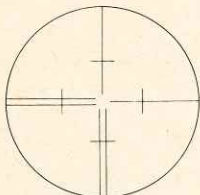
12V 18 AH

Tripods:

Recommended for use with this instrument (not included in price):
No. 7512-50 Wide Frame Extension Leg (Wood).
No. 7536-75 Wide Frame Extension Leg (Aluminum).



6¼-Inch Transit No. 625



Reticle supplied: glass, etched (Type D) stadia ratio 1:100. Constant is 0. Stadia lines short to distinguish them from cross lines.

Specially built to U. S. Government standards. A superior quality instrument for the most exacting jobs.

Stock No. 7323-20 Instrument only, double-direct reading to 20 seconds Each,

Stock No. 7323-30 Instrument only, double-direct reading to 30 seconds Each,

Telescope:

11½ inches, achromatic; internal focusing with negative lens in draw tube, straight cut rack and pinion. Erect image; reversible and balanced on axis. 28X magnification resolving to 3.5 seconds of arc. Minimum focus 5½ feet. Objective effective aperture 1½ inches (38.10 mm.). Field of view 1 degree. Bronze telescope axis with cylindrical bearings. All lens surfaces coated except first and last.

Levels:

Telescope — 3 inches reversible type. Sensitivity 40 seconds per 2 mm. Plate — 2 each level vial 1½ inches. Sensitivity 90 seconds per 2 mm.

Vertical Circle:

5-inch diameter graduated to 30 minutes on silver; numbered in quadrants. Vernier on silver, double-direct reading to 1 minute. Removable aluminum guard. (Stadia circle available at extra charge.)

Horizontal Circle:

6¼-inch diameter with graduations on silver. Double numbered 0-360 and 360-0, with figures inclined in direction of increase. Two verniers on silver double-direct reading to 20 seconds, or 30 seconds.

Compass:

3¾-inch blue-pointed needle with balancing copper strip, jewelled bearing and hardened steel pivot. Graduated to ½ degree and numbered in quadrants with adjustment for declination. Dustproof, threaded and removable cover of plate glass.

Construction:

Four replaceable leveling screws, fully enclosed with dust proof covers. Instrument can be rotated freely on its center or held firm in position with clamp screw. Lateral movement by tangent screw.* Standard American size base plate (3½ x 8). Hard bronze alloy center, specially aged and hand-fitted for freedom from friction and long wear. Bronze standards — U-shaped construction. Dull black wrinkle finish.

*Two speed tangent screw for upper motion is available on special order at extra cost.

Equipment:

Wood case with carrying strap and protected corners. Complete with sunshade, dust cap, eyepiece darkener, plumb bob, magnifier, adjusting pins, brush, spanner wrench, screwdriver and plastic rain hood.

Weight:

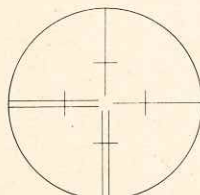
Instrument only — 16½ lbs. Case only — 13½ lbs.

Tripods:

Recommended for use with this instrument (not included in price):
No. 7511-00 Wide Frame Extension Leg. 3½ x 8.
No. 7533-75 Wide Frame Extension Leg. 3½ x 8.



5½-Inch Transit No. 550



Reticle supplied: glass, etched (Type D) stadia ratio 1:100. Constant is 0. Stadia lines short to distinguish them from cross lines.

The all-purpose transit. Ruggedly built to maintain its accuracy, yet not too heavy for convenient field work.

Stock No. 7324-20 Instrument only, double-direct reading to 20 seconds Each,

Stock No. 7324-30 Instrument only, double-direct reading to 30 seconds Each,

Stock No. 7324-60 Instrument only, double-direct reading to 1 minute Each,

Telescope:

9½ inches, achromatic; internal focusing with negative lens in draw tube, straight cut rack and pinion. Erect image; reversible and balanced on axis. 26X magnification resolving to 3 seconds of arc. Minimum focus 5½ feet. Objective effective aperture 1½ inches (38.10 mm.). Field of view 1 degree 10 minutes. Bronze telescope axis with cylindrical bearings. All lens surfaces coated except first and last.

Levels:

Telescope — 3 inches reversible type. Sensitivity, 40 seconds per 2 mm. Plate — 2 each level vial 1½ inches. Sensitivity, 90 seconds per 2 mm.

Vertical Circle:

4½-inch diameter graduated to 30 minutes on silver; numbered in quadrants. Vernier on silver double-direct reading to 1 minute. Removable aluminum guard. (Stadia circle available at extra charge.)

Horizontal Circle:

5½-inch diameter with graduations on silver. Double numbered 0-360 and 360-0, with figures inclined in direction of increase. Two verniers on silver, double-direct reading to 20 seconds, 30 seconds, or 1 minute.

Compass:

3¾-inch blue-pointed needle with balancing copper strip, jewelled bearing and hardened steel pivot. Graduated to ½ degree and numbered in quadrants with adjustment for declination. Dustproof, threaded and removable cover of plate glass.

Construction:

Four replaceable leveling screws, fully enclosed with dustproof covers. Instrument can be rotated freely on its center or held firm in position with clamp screw. Lateral movement by tangent screw. Standard American size base plate (3½ x 8). Hard bronze alloy center, specially aged and hand-fitted for freedom from friction and long wear. Standards bronze one-piece truss with adjustable friction cap; bronze bearings. Dull black wrinkle finish.

Equipment:

Wood case with carrying strap and protected corners. Complete with sunshade, dust cap, plumb bob, magnifier, adjusting pins, center key, brush, spanner wrench, screwdriver and plastic rain hood.

Weight:

Instrument only — 14¾ lbs. Case only — 10¾ lbs.

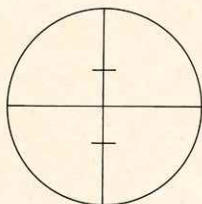
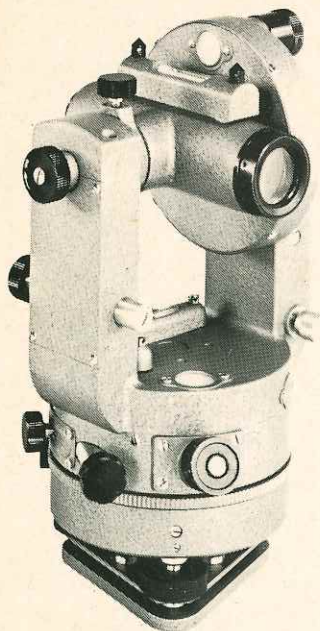
Tripods:

Recommended for use with this instrument (not included in price):
No. 7533-75 Wide Frame Extension Leg. 3½ x 8.

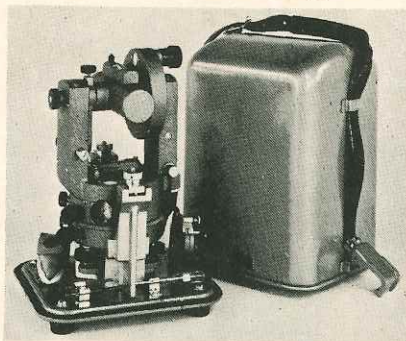
All tripods described on pages immediately following instrument listings.



Mountain and Mining Transit No. GT-60



Reticle supplied



This transit is ideally suited for mining applications since it has a short minimum focus. Circles are glass with coincident-reading verniers providing an easy readout capability even in areas with poor lighting.

The light weight of this instrument is an advantage when manual transportation in rugged terrain is necessary. The telescope will transit in both directions. Focusing is accomplished through the telescope axis so that the focusing problem encountered when the telescope is inverted on instruments with conventional focusing is eliminated.

Stock No. 7321-60 Instrument only Each,

Telescope:

4 $\frac{3}{4}$ " (115 mm) prismatic type. Erect image. 16 x magnification resolving to 5 seconds of arc. Objective aperture $\frac{13}{16}$ " (21 mm). Field of view 1° 20'. Minimum focus 3 $\frac{3}{4}$ ' (1 m).

Levels:

Telescope vial sensitivity — 60" per 2 mm.
Plate vials sensitivity — 137" per 2 mm.

Reticle:

Glass, etched. Type B — stadia ratio 1:100. Constant is 0.

Horizontal Circle:

2 $\frac{3}{4}$ " (70 mm) diameter graduated to 20 minutes on glass and double numbered 0-360 and 360-0. Two coincident-reading glass verniers superimposed over the horizontal circle are double-direct reading to 1 minute. Circle is viewed through permanently attached magnifiers and can be rotated to any desired setting by means of an external ring.

Vertical Circle:

2 $\frac{3}{4}$ " (70 mm) diameter graduated to 30 minutes on glass numbered 0-90 in quadrants with zero at the horizontal position. The glass vernier is coincident reading, double-direct to 1 minute; viewed through a permanently attached magnifier.

Compass:

Detachable from instrument. Circular with 1 $\frac{1}{32}$ " (34 mm) needle. Ring is graduated to 2°.

Construction:

Three fully-enclosed, replaceable, dustproof leveling screws. Double centers with lateral movement by upper and lower tangent screws. $\frac{5}{8}$ " x 11 thread base plate. Gray enamel finish. Special hardened aluminum alloy standards.

Equipment:

Metal carrying case, detachable compass, sunshade, dust cap, plumb bob, adjusting pins, screwdriver and plastic rain hood.

Weight:

Instrument only — 6.6 lbs. (3.0 Kg.) Case only — 6.2 lbs. (2.8 Kg.)

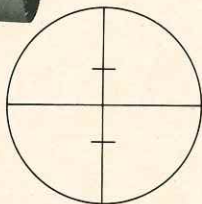
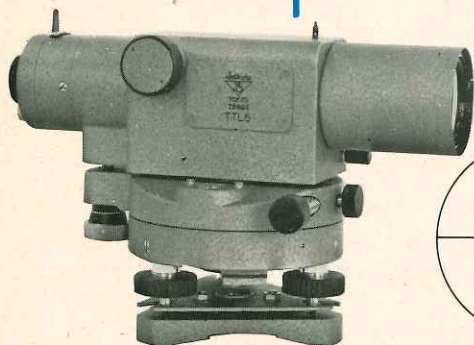
Tripod:

Recommended for use with this instrument (not included in price): No. 7536-75 Extension Leg $\frac{5}{8}$ " x 11 thread.

All tripods described on pages immediately following instrument listings.



Engineers Tilting Level No. TTL-5



Reticle supplied

A general purpose, highly accurate, tilt-action level for construction, highway, bridge and tunnel engineering work. A unique design feature allows viewing the split image level vial while sighting through the telescope. This provides much faster operation than with instruments in which the level bubble must be viewed through a separate sighting tube parallel to the telescope.

Stock No. 7355-00 Instrument only Each,

Telescope:

9.45 inches (240 mm) internal focusing, erect image. 30X magnification resolving to 2.5 seconds of arc. Objective aperture 1.57 inches (40 mm). Field of view 1°10'. Minimum focus 7.55 feet (2.3 m). All lens surfaces coated except exterior of first and last.

Reticle:

Glass, (type B) etched cross line and stadia lines with stadia ratio 1:100. Stadia lines are short to distinguish them from cross line.

Level Vials:

Circular level vial on instrument body for fast preliminary leveling. Sensitivity 6 minutes per 2 mm. Tubular level vial co-incident reading and viewed through telescope. Displacement sensitivity 40 seconds per 2/mm. Reading sensitivity 20 seconds per 2/mm.

Accuracy:

Attainable accuracy in 1 km (3280 ft) of double run leveling is ± 3 mm (.01 feet).

Construction:

Three replaceable leveling screws, fully enclosed with dust proof covers. Base plate of special design will accept standard $\frac{5}{8}$ " x 11 thread flat head tripods, or Lietz special domed head tripod for rapid set up.*

Tilting movement by screw located under telescope.
Gray enamel finish.

Equipment:

Hermetically-sealed steel case with adjusting pin, screwdriver, dust cap, sunshade and plastic rain cover.

Weight:

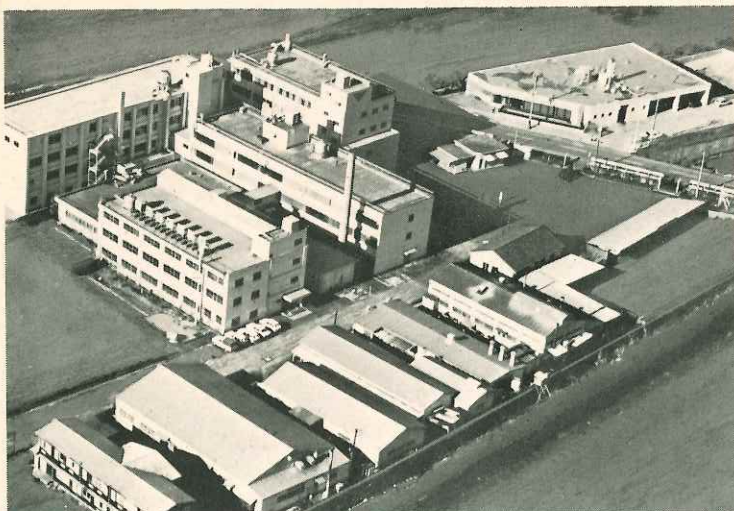
Instrument only — 6.2 lbs. (2.8 Kg.) Case only — 5.7 lbs. (2.6 Kg.)

Tripods:

Recommended for use with this instrument (not included in price):

*No. 7534-75 Wide Frame, Domed Head, Ext. Leg

No. 7536-75 Wide Frame, Flat Head, Ext. Leg



The main Sokkisha factory in Matsuda, Japan. This is one of five manufacturing plants the company operates.

All Lietz surveying instruments are manufactured to our specifications by Sokkisha Ltd., one of the oldest and most respected manufacturers of surveying equipment in the world. Every component — from casting to lenses — is produced by Sokkisha in one of its five large manufacturing plants in order to maintain the most stringent quality controls.

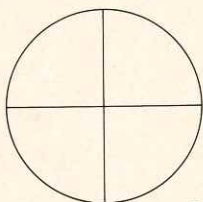
Since 1920, Sokkisha has specialized in the manufacture of surveying instruments. Today, these products remain the primary production goal. However, their factories also produce photogrammetric equipment, EDM equipment, magnetometers, stereoscopic cameras and other specialized instruments which Lietz will be introducing into the United States in the future.

Since 1882, the Lietz Company has been supplying surveyors and engineers with a complete line of the very finest surveying instruments and equipment. We will continue to maintain the same uncompromising standards of quality as we grow and expand to serve you even better in the future.

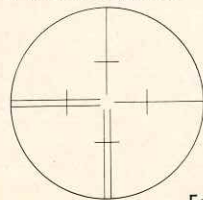
Lietz is the exclusive distributor for Sokkisha products in the United States.

Reticles

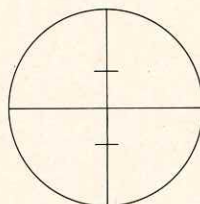
Lietz instruments are provided with spiderweb and glass reticles. While both are accurate, glass reticles have the added advantage of greater durability and the lines are not affected by atmospheric conditions. On glass reticles, a cover glass is cemented in place over the pattern. This serves the dual purpose of eliminating the possibility of damage to the fine lines and at the same time keeps dust particles out of the focal plane of the eyepiece.



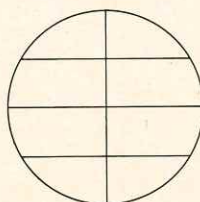
TYPE A Each,
Plain cross lines.
Supplied on Models 110, 200 (spiderweb).
Supplied on Model C-3 (glass).



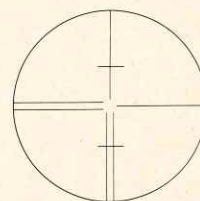
TYPE D Each,
Parallel horizontal and vertical lines combined with regular cross-lines with stadia lines spaced 1:100 horizontally and vertically. Glass.
Supplied on Models 625, 550, TM-1A, TM-10C, TM-20C, T-60D, 10-C, BT Series.



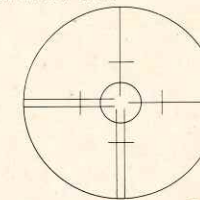
TYPE B Each,
Cross-lines, stadia spaced 1:100. Glass.
Supplied on Models B-1, B-2 and GT-60, available for Model C-3. 0.3:100 optional on B-1 and B-2.



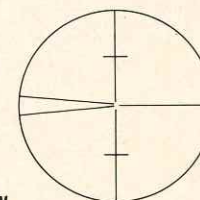
TYPE E Each,
Extended stadia lines 1:100.
Supplied on Model 115 (Spiderweb).
Available on glass for Model 550.



TYPE C Each,
Stadia lines spaced 1:100 vertically. Glass.
Supplied on Model 180.



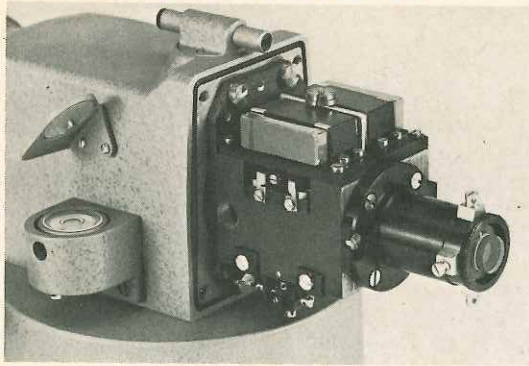
TYPE S Each,
Solar reticle — a combination of "D" with a circle 15' 45" semi-diameter for centering the sun's image. Glass. Stadia lines spaced 1:100 vertically and horizontally.
Available for Models 10-C, TM-1A, TM-10C, TM-20C, T-60D, 625 and 550.



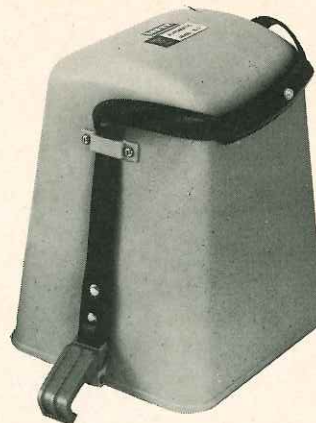
TYPE W Each,
Wedge shape on left side for use with precise leveling rods. Stadia lines 1:100.
Supplied on Model PL-5. Available for Model B-1.

Features of Lietz Automatic Levels

MAGNETIC DAMPING



Close-up view of magnetically-damped compensator used in models B-1, B-2 and C-3 automatic levels.



CARRYING CASES

Compact, lightweight, high-visibility plastic cases provide maximum protection for the instruments during storage or transportation.

Focusing Assembly

No plastic or synthetic parts are used in this critical wear area. Mechanism is constructed entirely of brass thus assuring years of durability.

Sighting Collimator

This unique device makes finding the leveling rod a breeze! Saves valuable field time.

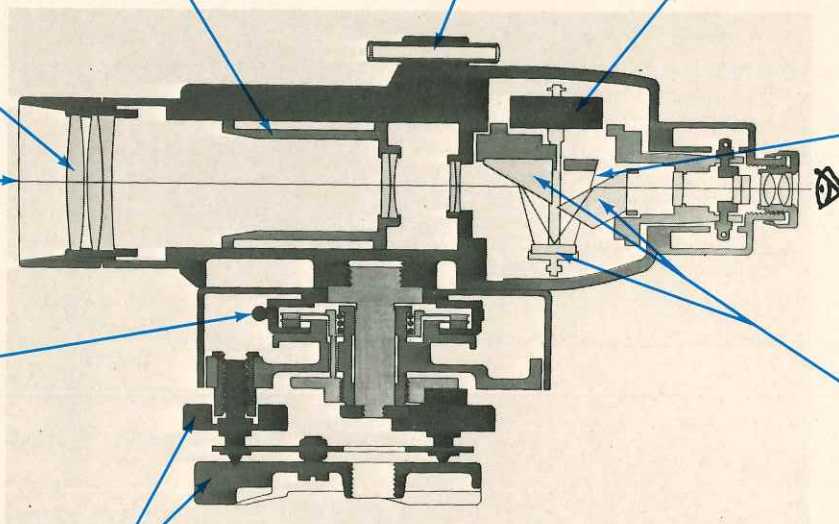
Magnetic Damping Device

Assures constant damping power throughout the leveling range of the compensator. Magnetic damping is not affected by the intrusion of dust particles which cause sticking or "hanging" in instruments with the common air-damped compensator. And permanent magnets are not affected by any external forces such as high voltage conductors or generators. Magnetic damping means the most stable and dependable image possible.

Objective Lens

Wide diameter objective lenses for maximum light gathering and therefore brilliant optical clarity. All lenses made from the finest quality optical glass, precision ground and polished to exacting specifications for distortion-free images.

LINE OF SIGHT



CROSS SECTION VIEW OF
MODEL B-1 LEVEL

Compensator Suspension

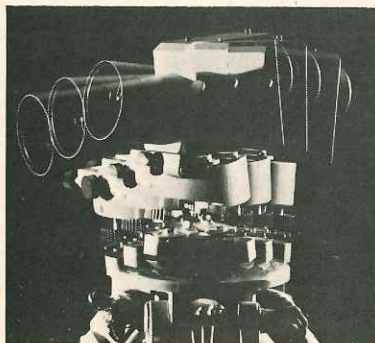
Our four-hinge, wire-hung compensator offers superior precision and repeatability and years of continuing accuracy since there are no pivots or ball bearing surfaces to wear and introduce errors. Lietz instruments are built in a special way so the suspension wires are unbreakable, even if the instrument is dropped!

Endless Tangent Drive

Friction-braked, endless-tangent drive operable from either side with controls at the objective end of the instrument for fast, convenient and easy operation.

Compensator Optics

First-surface mirrors are used wherever possible instead of prisms to keep light loss to a minimum. This means a brighter, clearer image delivered to the operator's eye, even when used in dark areas.



LEVELING BASE

Special design of the leveling plate permits use of a spherical "domed" head tripod for very rapid leveling of the instrument. (Instruments may also be used with conventional flat-head tripods.)

SUPERB QUALITY

The simplicity of design, the care and quality that go into Lietz Automatic Levels assure a lifetime of service under the most rugged conditions. And when maintenance or repair work is necessary, you enjoy reduced costs as compared to other makes.

GUARANTEE

Lietz Surveying Instruments are fully guaranteed against defects in workmanship or materials for the life of the instruments. The experience and reputation of the Lietz Company in the manufacture of precision equipment since 1882 stand behind this guarantee.



Engineers Precision Automatic Level No. B-1

Here is the ultimate achievement in the manufacture of an engineers automatic level. The special patented compensator design, combined with unsurpassed optics, provides this instrument with the brightest, steadiest and sharpest image possible.

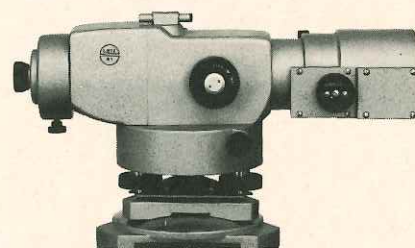
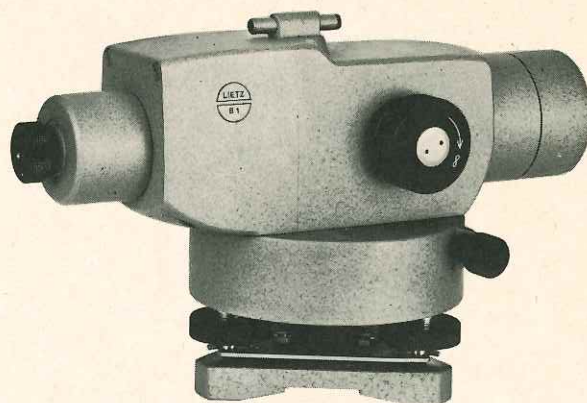
In addition, every desirable convenience feature is incorporated along with an incredible toughness and durability unmatched by any other automatic level.

The result is an instrument with an obtainable accuracy of ± 1.5 mm (0.005 feet) in 1 km (3280 feet) of double run leveling.

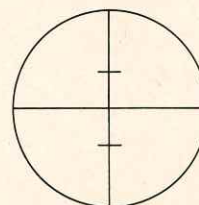
FEATURES:

- *Magnetically damped, four hinge, wire hung compensator constructed in such a way as to be virtually unbreakable in any type of field usage. Magnetic damping action eliminates the need to tap on the tripod or for devices such as buttons to push before readings are taken. It also eliminates the possibility of compensator "hang-ups" as experienced with instruments using air-damping.*
- *Focusing mechanism is fitted with a coarse — fine drive for quick sighting.*
- *Horizontal movement by endless tangent drive operable with either hand. Rotation is friction-braked with braking action easily adjustable externally.*
- *A collimator-type peep sighting gunscope is mounted in place of the conventional gun sights thus facilitating exact and rapid pointing.*
- *The 32X telescope is constructed using an anallactic optical system with a zero stadia constant.*
- *Ambient operating range -40° to $+140^{\circ}$ F (-40° to $+60^{\circ}$ C). Instrument is completely sealed against moisture entry.*
- *The leveling plate is designed so the instrument can be used with a domed head tripod for very rapid leveling or with a standard flat head tripod.*
- *Accessories available include parallel plate micrometer attachment and a battery pack for reticle illumination in tunnel projects or night work.*

Stock No. 7372-50 Instrument only, 1:100 stadia Each,
Stock No. 7372-00 Instrument only, 0.3:100 stadia Each,



Shown with Parallel Plate Micrometer



Reticle supplied

Telescope:

10.4 inches (265 mm). Erect image. 32X magnification resolving to 3 seconds of arc. Objective aperture 1.77 inches (45 mm). Field of view $1^{\circ}20'$ (23 feet @ 1000 ft.). Two-speed focus mechanism (fast movement for coarse focusing, slow for precise focusing). Minimum focus 8.0 feet (2.4 m). Telescope pointing by optical peep sight collimator. All lens surfaces coated to reduce reflection except outside of first and last.

Reticle:

Glass, etched cross and stadia lines (Type B) with stadia ratio 1:100 (optional 0.3:100). 0 stadia constant. Reticle adjusting screws accessible under collar at eyepiece end of telescope.

Compensator:

First surface mirror suspended by four special alloy wires which automatically level the line of sight. Magnetic self damping, unaffected by extreme temperatures or external magnetic forces. Compensating range ± 10 minutes. Setting accuracy ± 0.3 second.

Leveling Accuracy:

Attainable accuracy in 1 km (3280 feet) of double run leveling is ± 1.5 mm (.005 feet). Using parallel plate micrometer attachment: accuracy attainable in 1 km of double run leveling is ± 1.0 mm (.003 feet).

Level Vial:

One circular vial. Sensitivity 10 minutes per 2 mm. Viewed optically.

Construction:

Three replaceable leveling screws, fully enclosed with dustproof covers. Instrument base plate of special design will accept standard $\frac{5}{8}$ x 11 thread flat head tripods, or Lietz special domed head tripod for rapid set-up.*

Horizontal instrument rotation against friction brake. Endless tangent screw movement can be operated by either right or left hand. Braking action adjustable externally. Gray enamel finish.

Equipment:

Hermetically-sealed case complete with adjusting pin, screwdriver, dust cap, plastic rain cover and instruction manual.

Optional Accessories:

Parallel Plate Micrometer with counterweight and leather carrying case.

	Range	Graduated Interval	Estimation
No. 7372-14	0.01 ft.	0.001 ft.	0.0001 ft.
No. 7372-15	10 mm.	0.1 mm	0.01mm

Weight:

Instrument only — 6.5 lbs. (2.9 kg). Case — 3.5 lbs. (1.5 kg).

Tripods:

Recommended for use with this instrument (not included in price):

- No. 7512-50 Wide Frame, Flat Head $\frac{5}{8}$ x 11 Extension Leg.
- *No. 7515-50 Wide Frame, Domed Head, $\frac{5}{8}$ x 11 Extension Leg



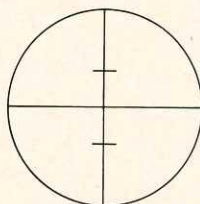
Engineers Automatic Level No. B-2

Currently the best selling automatic level *in the world!*

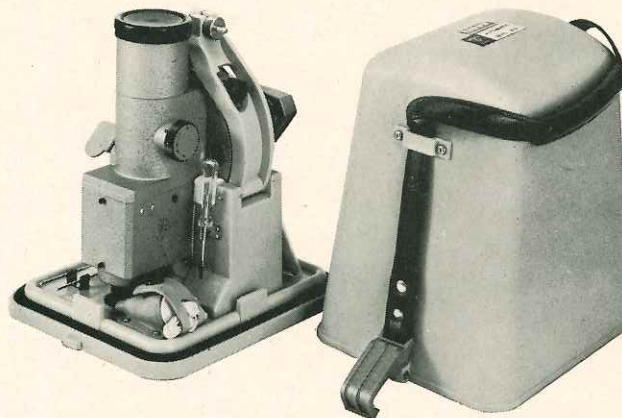
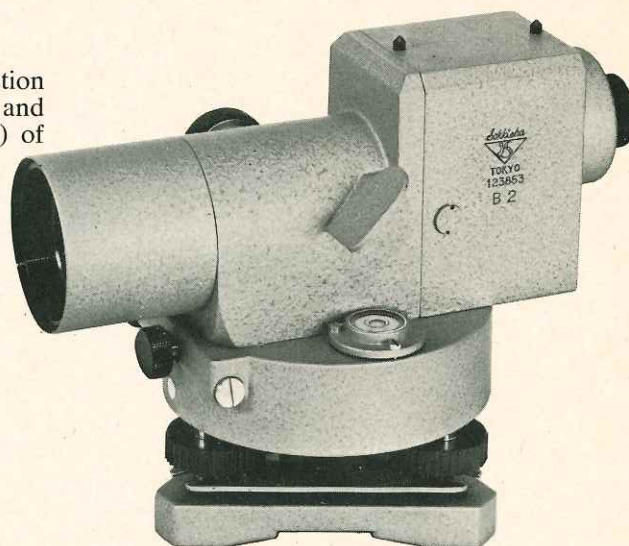
The ingenious simplicity of design together with rugged construction enable this professional instrument to take all ordinary shocks and vibrations in stride. In fact, the error in 1 kilometer (3280 ft.) of double run leveling is 3 mm (.01 ft.)!

FEATURES:

- Shock and vibration resistant.
- A specially designed optical system with a minimum number of lenses and prisms gives a brighter, erect image combined with high magnification.
- The leveling plate is designed so the instrument can be used with the domed-head tripod for fast leveling or with a standard flat-head tripod.
- Horizontal circle can be rotated and is easily reset to zero with a knob. Circle is extremely legible.
- Extremely tough, magnetically-damped, wire-hung compensator for accuracy and dependability.
- Compact, shockproof case.



Reticle supplied



Stock No. 7381-50 Each,

Telescope:

8.27 inches (210 mm). Erect image. 28X magnification resolving to 3 seconds of arc. Objective aperture 40 mm; Field of view $1^{\circ}5'$. Minimum focus 5.9 feet (1.8 m). Gunsight aiming device. All lenses coated except first and last.

Reticle:

Glass, etched cross and stadia lines with stadia ratio 1:100 (Type B). Constant is +15 cm. Stadia lines are short to distinguish them from cross lines. Cross line adjusting screws accessible under collar at eyepiece end.

Horizontal Circle:

3.15 inch (80 mm) graduated to single degrees.

Compensator:

First surface mirror suspended by 4 special alloy wires which automatically level the line of sight. Magnetic self damping device steadies the image. Range ± 10 minutes. Setting accuracy ± 0.5 second.

Accuracy:

Attainable accuracy in 1 kilometer (3280 feet) of double run leveling is ± 3 mm. (.010 feet).

Level:

One circular level vial. Sensitivity 10 minutes per 2 mm. Viewed by mirror reflector.

Construction:

Three replaceable leveling screws, fully enclosed with dustproof covers. Base plate of special design will accept standard $\frac{5}{8}$ x 11 thread flat head tripods, or Lietz special domed head tripod for rapid set-up*. Horizontal instrument rotation by tangent screw. Gray enamel finish.

Equipment:

Hermetically-sealed high visibility plastic case complete with adjusting pin, screwdriver, dust cap and plastic rain cover.

Weight:

Instrument only — 6.2 lbs. Case only — 2.9 lbs.

Tripods:

Recommended for use with this instrument (not included in price):

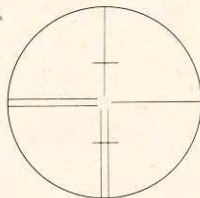
No. 7512-50 Wide Frame, Flat Head $\frac{5}{8}$ x 11 Extension Leg.

*No. 7515-50 Wide Frame, Domed Head, $\frac{5}{8}$ x 11 Extension Leg.

*No. 7534-75 Wide Frame, Domed Head, $\frac{5}{8}$ x 11 Extension Leg.



18-inch Engineers Level No. 180



Reticle supplied

The ideal instrument for contractors, builders, planning engineers . . . to set grades, establish foundation levels, set batter boards and many other uses. Keeps its inherent accuracy through long, hard use.

Stock No. 7351-00 Instrument only Each,

Telescope:

18 inches, achromatic; internal focusing, erect image, minimum focus 7 feet. Objective effective aperture $1\frac{3}{4}$ inches (44.5 mm.). Field of view 58 minutes. Magnification 33X, resolving to 2.5 seconds of arc. All lens surfaces coated except first and last.

Reticle:

Glass, etched (type C) stadia ratio 1:100. Stadia lines are short to distinguish them from cross lines.

Level:

$4\frac{1}{2}$ -inch level vial. Sensitivity 20 seconds per 2 mm.

Construction:

Four replaceable leveling screws, fully enclosed with dustproof covers. Supports bronze, soldered to telescope and screwed to level bar for extra rigidity. Square level bar of aged bronze alloy encasing level vial. Center of alloy steel, double tapered, hand fitted and true. Instrument can be rotated freely on its center or held firm in position with clamp screw. Lateral movement by tangent screw. Standard American size base plate ($3\frac{1}{2}$ x 8). Dull black wrinkle finish prevents reflection.

Equipment:

Wood case with carrying strap, adjusting pins, screwdriver, dust cap, sunshade, eyepiece filter and plastic rain cover.

Weight:

Instrument only — $9\frac{3}{4}$ lbs. Case only — 6 $\frac{1}{2}$ lbs.

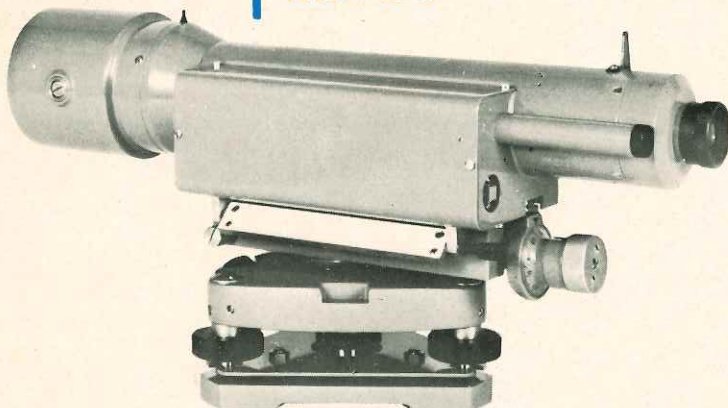
Tripods:

Recommended for use with this instrument (not included in price): No. 7533-75 Wide Frame Extension Leg— $3\frac{1}{2}$ x 8

All tripods described on pages immediately following instrument listings.

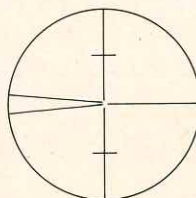
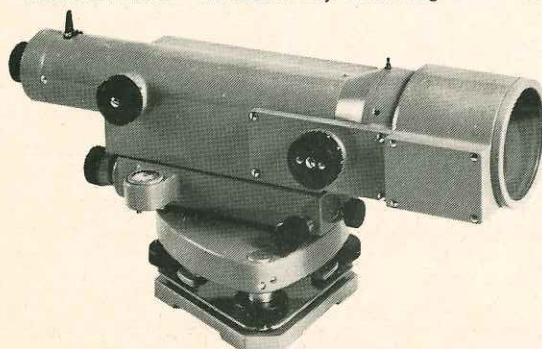


Precise Level No. PL-5



A high precision instrument capable of producing 1st order accuracy for geodetic leveling, aircraft tooling, machinery mounting or other applications requiring extreme accuracy.

Stock No. 7375-00 Instrument only. Inverted Image Each,
Stock No. 7375-50 Instrument only. Erect Image Each,



Reticle supplied

Telescope:

14 inches (355 mm), internal focusing. 42X magnification resolving to 2 seconds of arc. Objective aperture 1.97 inches (50 mm). Minimum focus 9.8 feet (3 m). Field of view $1^{\circ}5'$. All lens surfaces coated except exterior of first and last.

Reticle:

Glass, etched wedge shaped lines. Stadia lines have a 1:100 ratio with an additional constant of —30 cm. (—0.98 feet).

Level Vials:

Circular vial on instrument body with sensitivity of 3.5 minutes per 2 mm for rough leveling. Split image tubular vial on telescope with sensitivity of 10 seconds per 2 mm. This bubble is viewed prismatically through a sighting tube along side the telescope eyepiece.

Accuracy:

Attainable accuracy in 1 kilometer (3280 feet) of double run leveling is ± 1 mm (.003 ft).

Construction:

A parallel plate micrometer in front of the telescope objective lens enables vertical displacement to be measured to 0.1 mm (.0039 inch) with a measuring range of 10 mm (.394 inch).

The telescope tilting screw has a graduated dial. Each dial graduation indicates 2 arc seconds (calc) thus providing distance measuring capability using a leveling rod in the same manner that a theodolite is used in conjunction with a subtense bar.

Three replaceable leveling screws each fully enclosed with dust proof covers. Instrument may be rotated freely on its center or held firm by clamp. Lateral movement by tangent screw. Instrument base plate has standard $\frac{5}{8}$ x 11 thread.

Finish:

Grey enamel.

Equipment:

Hardwood carrying case complete with screwdriver, adjusting pins, lens brush, lens cap and plastic dust cover.

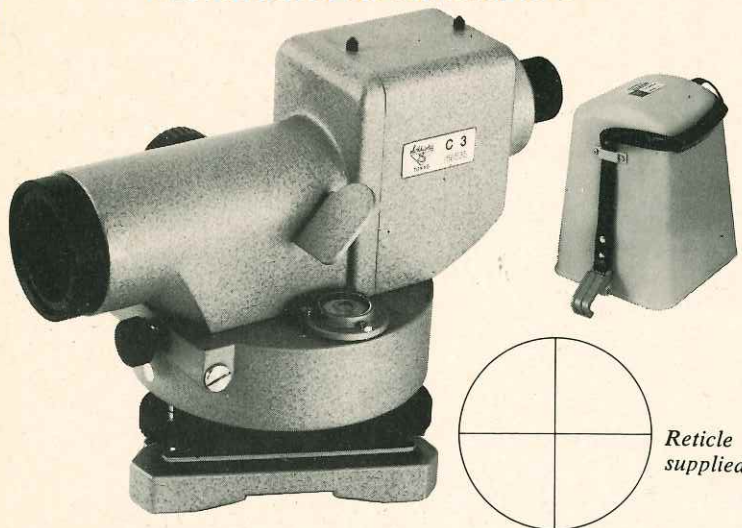
Weight:

Instrument only — 12 lbs. 12 oz. Case only — 7 lbs. 12 oz.

Tripods:

Recommended for use with this instrument (not included in price): No. 7512-50 Wide Frame, Flat-Head, $\frac{5}{8}$ " x 11 Extension Leg Tripod

Automatic Level No. C-3



This contractor's automatic level has an extremely tough, magnetically-damped wire-hung compensator that will give you all the accuracy you need (error less than 3/16" in a 5/8 mile level run) but built in such a way that there is no concern about breaking the compensator wires.

The leveling plate is designed so the instrument can be used with the domed-head tripod for fast leveling or with a standard flat head tripod. This automatic level will withstand years of rough treatment — the kind that construction usage involves — and still maintain its accuracy and dependability.

Stock No. 7384-50 Each,

Telescope:

8.27 inches (210 mm.) Erect image. 22x magnification resolving to 4 seconds of arc. Objective aperture 30 mm; Field of view 1° 25'. Minimum focus 5.0 feet (1.6 m). Gunsight aiming device. All lenses coated except first and last.

Reticle:

Cross etched on glass. (Type A).

Horizontal Circle:

Circle graduated to single degrees.

Instrument is provided with circle orientation set knob for setting circle to zero.

Compensator:

First surface mirror suspended by 4 special alloy wires which automatically level the line of sight. Magnetic self damping device steadies the image. Range ± 6 minutes. Setting accuracy ± 0.5 second.

Accuracy:

Attainable accuracy in 1 kilometer (3280 feet) of double run leveling is ± 5 mm. (.016 feet).

Level:

One circular level vial. Sensitivity 10 minutes per 2 mm. Viewed by mirror reflector.

Construction:

Three replaceable leveling screws, fully enclosed with dustproof covers. Base plate of special design will accept standard $\frac{5}{8}$ x 11 thread flat head tripods, or Lietz special domed head tripod for rapid set-up*. Horizontal instrument rotation by tangent screw. Gray enamel finish.

Equipment:

Hermetically-sealed high visibility plastic case complete with adjusting pin, screwdriver, dust cap and plastic rain cover.

Weight:

Instrument only — 5.1 lbs. Case only — 2.9 lbs.

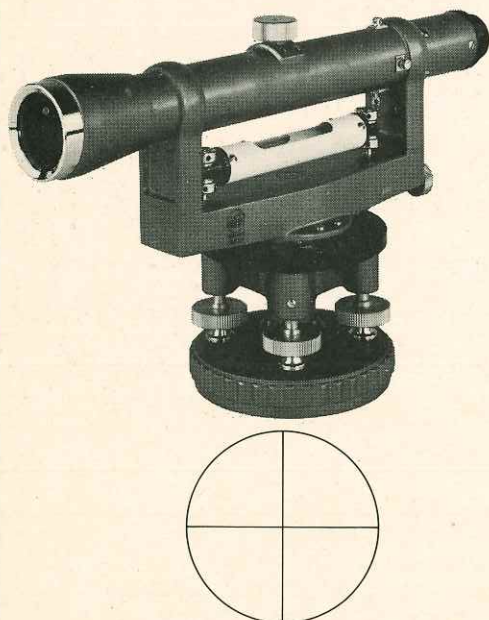
Tripods:

Recommended for use with this instrument (not included in price):

No. 7536-75 Wide Frame, Flat Head $\frac{5}{8}$ x 11 Extension Leg.

*No. 7534-75 Wide Frame, Domed Head, $\frac{5}{8}$ x 11 Extension Leg.

Builders' Level No. 110



Reticle supplied

For work up to 300 feet and for jobs requiring accuracy within 0 to 5/32" at 150 feet.

A low-cost, lightweight instrument that is tough enough to work right along with you on the hardest jobs—year after year. All the accuracy you need for most applications.

Stock No. 7362-00 Instrument only Each,

Telescope:

12 inches, achromatic; internal focusing, erect image. Minimum focus, 6.23 feet. Objective effective aperture 1-5/16 inches (33 mm.). Field of view 1 degree. Magnification 26X resolving to 3 seconds of arc. All lens surfaces coated except first and last.

Reticle:

Spiderweb cross hair (type A).

Level:

3-inch level vial. Sensitivity 90 seconds per 2 mm.

Horizontal Circle:

Diameter 3.15 inches graduated to 1 degree. Numbered in quadrants with double vernier reading to 5 minutes. Black anodized aluminum — engine divided graduations.

Construction:

Four replaceable leveling screws, fully enclosed with dustproof covers. Center of strong alloy steel. Instrument can be rotated freely on its center or held firm in position with clamp screw. Lateral movement by tangent screw. Standard American size base plate (3 1/2 x 8). Gray enamel finish.

Equipment:

Case with carrying strap, adjusting pins, dust cap, sunshade, plumb bob and plastic rain cover.

Weight:

Instrument only — 4 1/4 lbs. Case only — 5 1/2 lbs.

Tripods:

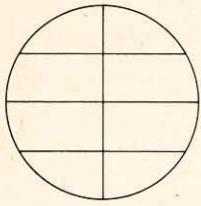
Recommended for use with this instrument (not included in price):

No. 7533-75 Wide Frame Extension Leg—3 1/2 x 8.

No. 7570-00 Straight Leg 3 1/2 x 8.

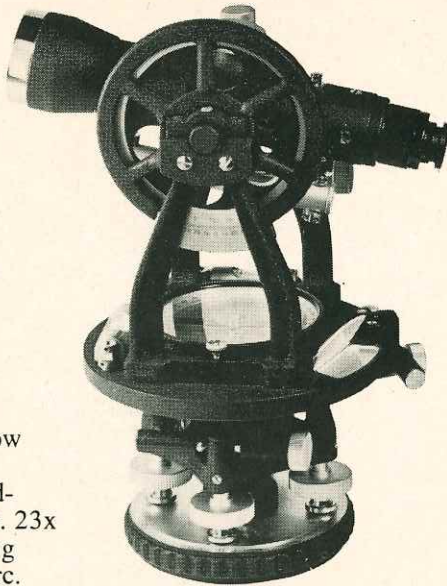
All tripods described on pages immediately following instrument listings.

Utility Transit No. 115



Reticle supplied
Stadia ratio 1:100

A rugged, yet precise instrument that will meet your most exacting needs now and for years to come. Direct reading to one minute. 23x telescope resolving to 4 seconds of arc.



Stock No. 7327-60 Instrument only Each,

Telescope:

7¼ inches, achromatic; internal focusing with negative lens in draw tube, straight cut rack and pinion, erect image, reversible and balanced on axis. 23X magnification resolving to 4 seconds of arc. Minimum focus 7¼ feet. Objective effective aperture 1¼ inches (32 mm.). Field of view 1 degree 5 minutes. Bronze telescope axis with cylindrical bearings. All lens surfaces coated except first and last.

Levels:

Telescope — 2½ inches reversible type. Sensitivity 60 seconds per 2 mm. Plate — 2 each level vial 1½ inches. Sensitivity 137 seconds per 2 mm.

Vertical Circle:

3½-inch diameter graduated to 30 minutes on alloy; numbered in quadrants. Vernier on silver double-direct reading to 1 minute. Removable aluminum guard.

Horizontal Circle:

4-5/16-inch diameter with graduations on alloy. Numbered 0-360 and 360-0 with numbers inclined in the direction of increase. Single vernier on alloy double-direct reading to 1 minute.

Compass:

2¾-inch blue-pointed needle with balancing copper strip, jewelled bearing and hardened steel pivot. Graduated to 1 degree and numbered in quadrants.

Construction:

Four replaceable leveling screws, fully enclosed with dust proof covers. Instrument can be rotated freely on its center or held firm in position with clamp screw. Lateral movement by tangent screw. Standards: bronze one-piece truss with adjustable friction cap, bronze bearings. Hard bronze alloy center, hand-fitted and true. Dull black wrinkle finish prevents reflection. Standard American size base plate (3½ x 8).

Equipment:

Wood case with carrying strap. Complete with sunshade, dust cap, plumb bob, magnifier, adjusting pins, screwdriver and plastic rain hood.

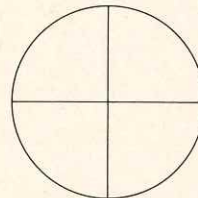
Weight:

Instrument only — 7 lbs. 8 oz. Case only — 7¼ lbs.

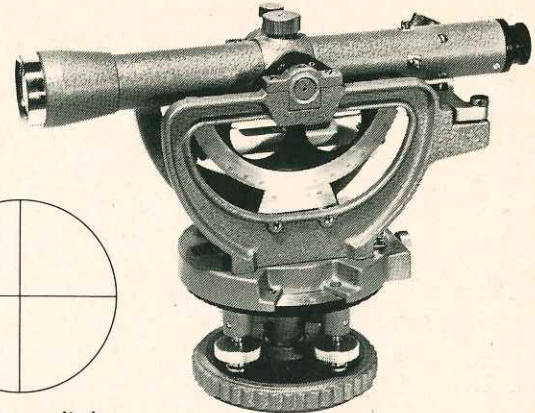
Tripods:

Recommended for use with this instrument (not included in price):
No. 7533-75 Wide Frame Extension Leg 3½ x 8.

Builders' Transit-Level No. 200



Reticle supplied



For work up to 300 feet and for jobs requiring accuracy within 0 to 5/32" at 150 feet.

A versatile instrument that will perform the functions of a transit, yet simple positive magnetic locking mechanism secures telescope in horizontal position for use as a level.

Weights only 7¾ pounds for easy portability. Built to give long, hard field use while retaining its inherent accuracy.

Stock No. 7367-00 Instrument only Each,

Telescope:

12 inches, achromatic; internal focusing with negative lens in draw tube. Erect image. 26X magnification resolving to 3 seconds of arc. Minimum focus 6.23 feet. Objective effective aperture 1¾ inches (33 mm.). Field of view 1 degree. All lens surfaces coated except first and last.

Levels:

Telescope level vial 2¾ inches. Sensitivity 90 seconds per 2 mm. Plate level vial 1½ inches. Sensitivity 137 seconds per 2 mm.

Locking Device:

Simple positive magnetic locking mechanism secures telescope in horizontal position for leveling use.

Vertical Arc:

5½-inch diameter graduated to 1 degree; reading both elevation and depression to 45 degrees. Vernier reading to 5 minutes.

Horizontal Circle:

3½-inch diameter graduated to 1 degree. Vernier double direct reading to 5 minutes.

Construction:

Four replaceable leveling screws, fully enclosed with dust proof covers. Instrument can be rotated freely on its center or held firm in position with clamp screw. Lateral movement by tangent screw. All bearings and sliding surfaces dustproof. Standards of aged bronze. Leveling head and center of hard bronze. Standard American size base plate (3½ x 8). Gray enamel finish.

Equipment:

Case with carrying strap. Complete with plumb bob, dust cap, sunshade, adjusting pins and plastic rain hood.

Weight:

Instrument only — 7¾ lb. Case only — 7¼ lb.

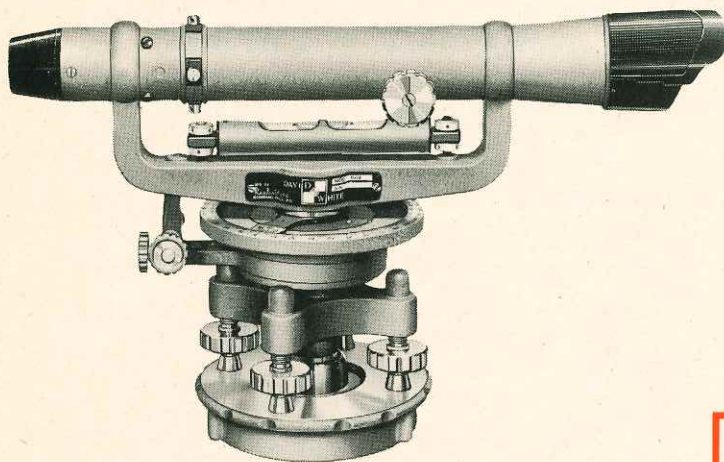
Tripods:

Recommended for use with this instrument (not included in price):
No. 7533-75 Extension Leg 3½ x 8.
No. 7570-00 Straight Leg 3½ x 8.

For work up to 300 feet and for jobs requiring accuracy within 0 to 3/16" at 150 feet.

FEATURES

- Variable power (optional)*
- 26 power telescopes
- Pre-loaded, double ball-bearing centers with permanently-lubricated outer races
- Covered leveling screws
- Vernier reading to 5 minutes (1/12 degree)
- Exclusive, 2-point lock system for positive level alignment (level transit)
- Furnished with case, plumb bob, sunshade, adjusting pins, trivet points, instructions
- 3 1/2" x 8 thread base plate



UNIVERSAL LEVEL

Stock No. 7664-00 David White No. 8114 . . . Each,
 Stock No. 7664-10 David White No. 8123
 Variable Power* . . . Each,

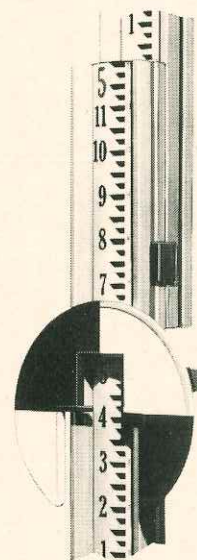


UNIVERSAL LEVEL-TRANSIT

Stock No. 7661-00 David White No. 8300 . . . Each,
 Stock No. 7661-10 David White No. 8307
 Variable Power* . . . Each,

	UNIVERSAL LEVEL-TRANSIT 8300	UNIVERSAL LEVEL 8114
TELESCOPE		
Length	12"	12"
Minimum Focus	6'	6'
Aperture	1.257	1.257
Power	26X *	26X *
Field at 100'	1 3/4 ft. *	1 3/4 ft. *
STANDARDS	Zamac Alloy	Zamac Alloy
HORIZONTAL CIRCLE		
Graduation Diameter	4"	4"
Graduations	Ea. 1°, 5°, 10°	Ea. 1°, 5°, 10°
Numbers	Ea. 10°, 0-90-0°	Ea. 10°, 0-90-0°
Vernier	to 5 min.	to 5 min.
CENTER	Double row ball bearing	Double row ball bearing
LEVEL VIAL		
Telescope	110-120 sec. per 2 mm. or 75 sec.	110-120 sec. per 2 mm. or 75 sec.
WEIGHT		
(Instr. only)	9 3/4 lbs.	7 1/4 lbs.
(Instr., case, plumb bob)	18 1/4 lbs.	17 1/2 lbs.
(Plumb Bob)	6 oz.	6 oz.
CASE	Fiberglass	Fiberglass
TRIPOD	9010-9015	9010-9015

*Variable Power instruments have the following specifications:
 Telescope: Power — 24-37X . . . Field @ 100' — 2.0' to 1.3'.
 Level Vial: 75 Sec. per 2 mm.

David White
Rods
and Targets

Made of select magnolia wood which is light, strong and will not warp. The rod extends easily and locks in any desired position. Replaceable tape with easy-to-read graduations is mounted on a curved surface to prevent reflection. Metal foot plate on lower end. Inch graduated rods have sliding, removable target.

Stock No.	Mfrs. No.	Description	Each
8075-60	7688	Two Section 9 1/2 ft. Rod in feet, inches, eighths. With target . . .	
8075-61	7689	Three Section 14 ft. Rod in feet, inches, eighths. With target . . .	
8075-64	7691	Two Section 9 1/2 ft. Rod in feet, 10ths, 100ths . . .	
8075-65	7690	Three Section 14 ft. Rod in feet, 10ths, 100ths . . .	
8075-69	7674-704	Target only, 5 inch diameter . . .	

For work up to 200 feet and for jobs requiring accuracy within 0 to 1/4" at 100 feet.

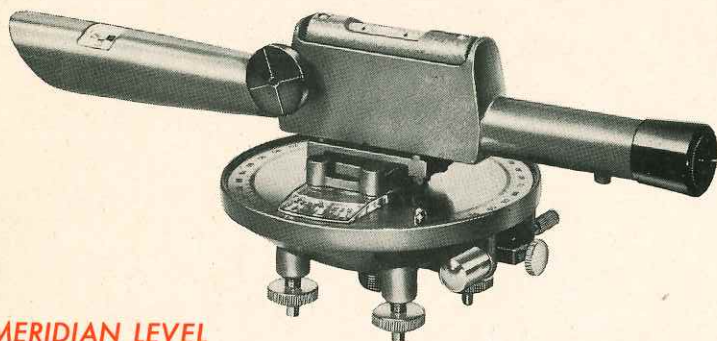
These popular instruments combine many of the features builders want. Consistently accurate for both short and long range sighting, they are built for simple operation and rugged on-the-job reliability.

Graduated circle is fully enclosed against dirt or moisture . . . rotates for zero settings . . . transparent vernier permits readings to fifteen minutes. Leveling plate has permanent built-in lubricating system.

Level transit has one-piece, U-shaped standard like higher-priced instruments. Lock lever provides positive 3-point locking action when instrument is used as a level. Both models have clamp and tangent screws for precise telescope movement and a built-in telescope sunshade.

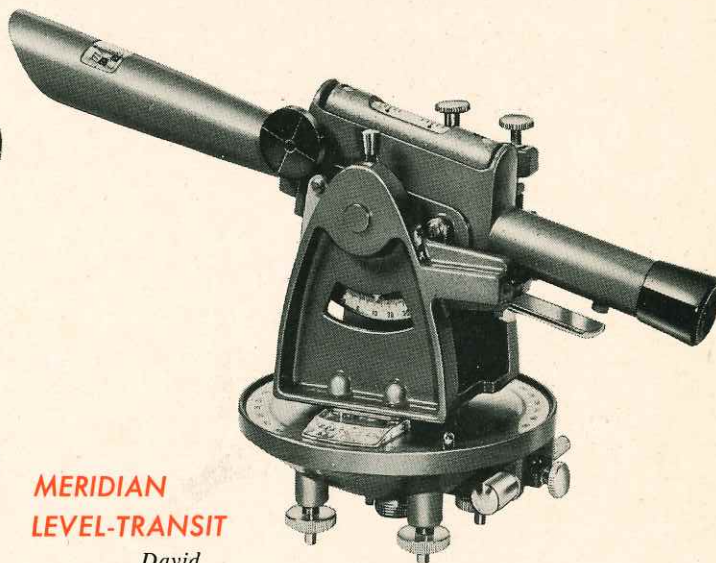
18-power optics have either-hand, internal focusing. Supplied with case, plumb bob and instructions.

	MERIDIAN LEVEL-TRANSIT 8080	MERIDIAN LEVEL 8090
TELESCOPE		
Length	10 1/2"	10 1/2"
Minimum Focus	4'	4'
Aperture	.750	.750
Power	18X	18X
Field at 100'	3 1/2 ft.	3 1/2 ft.
STANDARDS	Aluminum Alloy	Aluminum Alloy
HORIZONTAL CIRCLE		
Graduation Diameter	3 5/8"	3 5/8"
Graduations	Ea. 1°, 5°	Ea. 1°, 5°
Numbers	Ea. 10°, 0-90-0°	Ea. 10°, 0-90-0°
Vernier	to 15 min.	to 15 min.
CENTER	Planar	Planar
LEVEL VIAL		
Telescope	9-11 min. per 2 mm.	9-11 min. per 2 mm.
WEIGHT		
(Instr. only)	3 1/2 lbs.	2 1/2 lbs.
(Instr., case, plumb bob)	6 1/4 lbs.	5 1/4 lbs.
(Plumb Bob)	3 oz.	3 oz.
CASE	Fiberglass	Fiberglass
TRIPOD	9031-9042	9031-9042



MERIDIAN LEVEL

Stock No.	David White No.	Description	Each
7635-00	8090	Meridian Level	



MERIDIAN LEVEL-TRANSIT

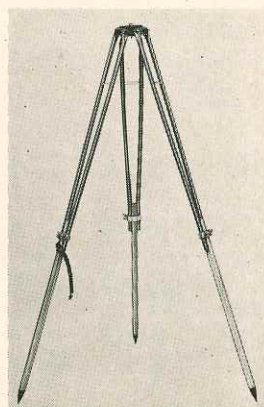
Stock No.	David White No.	Description	Each
7632-00	8080	Meridian Level-Transit	



7571-11

Wide Frame Aluminum Tripods for Universal Instruments

Stock No. 7570-00	D.W. No. 9010	Fixed Leg 59"	3 1/2 x 8 Thread
Stock No. 7571-11	D.W. No. 9015	Ext. Leg 36" to 59"	3 1/2 x 8 Thread



7639-08

Steel Tripods for Meridian Instruments

Stock No. 7639-03	D.W. No. 9031	Fixed Leg	Special Thread
Stock No. 7639-08	D.W. No. 9042	Ext. Leg 39" to 61"	Special Thread

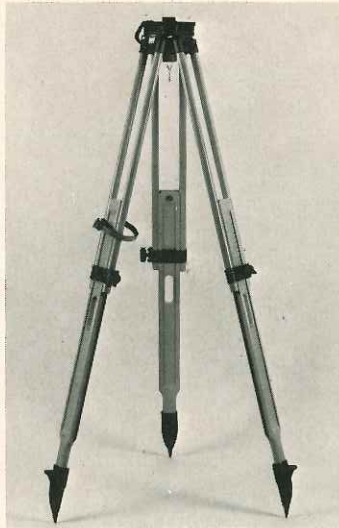
DAVID WHITE TRIPODS



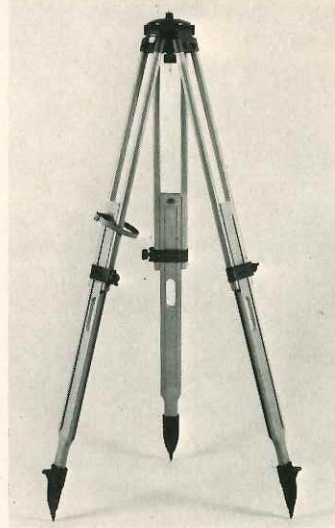
REPLACEMENT CARRYING CASES

Lightweight fiberglass carrying cases provide maximum instrument protection. Cases are brilliant "safety-orange" color for easy visibility in the field.

Stock No. 7639-95	Case for 8080 and 8090
Stock No. 7669-95	Case for 8114 and 8300



7512-50

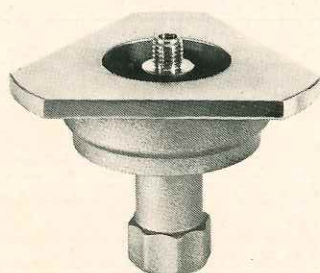


7515-50

There are several good reasons why many government and state highway departments are now using our improved wide frame tripods (European type). These excellent hardwood tripods are available in either regular or extra length extension leg types.

- Significantly greater stability due to the wide, all metal hinge joined to the head. This also assures less vibration in high winds.
- Extra long steel shoes with properly positioned large spurs which can be pushed firmly in ground for greater anchoring power.
- Sliding part of extension leg type has cut-out for easy carrying.
- Hinges that do not have to be loosened or tightened after each set-up.
- Maximum visibility — tripod legs are painted a high visibility color for safety.
- Hardened steel, replaceable tripod shoe points.
- Durable, nylon bushings add to smooth operation.

Stock No.	For use with Instrument	Type	Height Open	Height Closed	Weight	Type of Head	Each
7511-00	625, 550	Extension leg	65"	41"	13 lbs.	3½ x 8 Thread	
7511-02		Extra length Extension leg	72"	45¾"	14½ lbs.	3½ x 8 Thread	
7512-50	Theodolites and Levels	Extension leg	65"	41"	13 lbs.	⅝ x 11 Thread Flat Head	
7512-52		Extra length Extension leg	72"	45¾"	14½ lbs.	⅝ x 11 Thread Flat Head	
7515-50	B-1, B-2, C-3	Extension leg	65"	41"	13 lbs.	⅝ x 11 Thread Domed Head	
7515-52		Extra length Extension leg	72"	45¾"	14½ lbs.	⅝ x 11 Thread Domed Head	



Adapter Heads

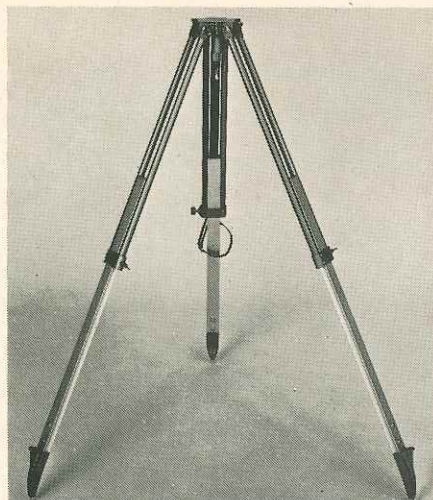
Fit tripods having standard U.S. threads 3½ x 8.

Stock No. 7311-08 Adapts to ⅝ x 11 thread. Flat head.

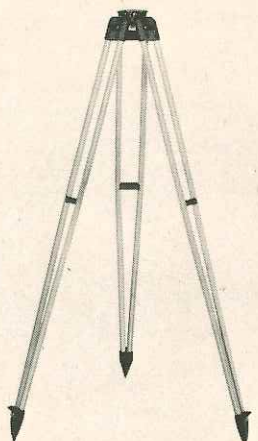
Stock No. 7370-09 Adapts to ⅝ x 11 thread. Domed head.



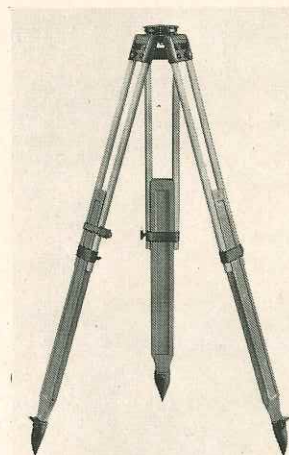
Wide Frame All Aluminum Tripod



7536-75



7570-00



7571-11

Lietz offers these all-aluminum tripods in orange and silver anodized finishes for high visibility. A sling strap is in-

cluded for hand or shoulder carrying. The longer length provides more versatility.

Stock No.	For use with Instrument	Type	Height Open	Height Closed	Weight	Type of Head	Each
7533-75	625, 550, 115	Extension leg	66½"	40"	11½ lbs.	3½ x 8 Thread	
7534-75	B-2, C-3	Extension leg	66½"	40"	11½ lbs.	5/8 x 11 Thread Domed Head	
7536-75	Theodolites and Levels	Extension leg	66½"	40"	11½ lbs.	5/8 x 11 Thread Flat Head	

David White Tripods

Wide frame aluminum and wood tripods.

7570-00 (9010)	Models 8114, 8300	Straight leg	59"		9½ lbs.	3½ x 8 Thread	
7571-11 (9015)		Extension leg	59"	36"	12 lbs.	3½ x 8 Thread	
7570-50 (9011)	Theodolites and Levels	Straight leg	59"		12 lbs.	5/8 x 11 Thread Flat Head	

Tripod Parts

To order, specify **Stock No. 7580** followed by correct Part No.

	Tripod 7511-00 7511-02	Tripod 7512-50 7512-52	Tripod 7515-50 7515-52	Tripod 7532-00 7533-00	Tripod 7534-50 7535-50	Tripod 7536-75	Tripod 7536-10 7536-60	Tripod 7533-75	Tripod 7534-75
Tripod Head complete with cap	01	06	08	02	05	04	04	03	05
Tripod Cap	20	24	22	20	22	24	24	20	22
Clamp Block with screw	30	30	30						
Instrument fastening screw assembly		18	16		16	18	18		16
"D" Ring part of above assembly		180	160		160	180	180		160
Bolt with wing nut & washer					36	35	36	35	35
Leg only for straight leg tripod	40	40	40	34	42		43		
Leg only for extension leg tripod*	47	47	47	48	49	46	49	46	46
Leg hinge bracket complete	50	50	50						
Round side piece for wide-frame, straight leg tripod	53	53	53						
Side piece for extension leg tripod*	54	54	54	55	55	52	56	52	52
Sliding member for extension leg tripod*	57	57	57	58	58	60	59	60	60
Clamps for extension tripod leg	70	70	70	72	72	73	72	73	73
Tripod shoe	80	80	80	81	81	83	81	83	83
Replaceable steel tip	89	89	89	90	90	90	90	90	90
Strap	95	95	95	95	95	93	95	93	93

*On wood tripods, specify exact length of part needed.



Diagonal Eyepiece Prism with Darkener

Stock No. 7329-31 Each,

Slips over the regular eyepiece cap on transit. Prism delivers the image at a 90° angle to line sight of telescope. A moveable darkener permits solar observations. Specify instrument model when ordering.



Diagonal Eyepiece Prisms (set) for Theodolites

Stock No. 7329-35 Set,

Prisms fit all our theodolites. Slips over the regular eyepiece cap on the telescope and circle reader microscope. Permits sightings with the telescope elevated to approximately 65°. Telescope prism has a moveable darkener which permits solar observations. Complete with leather case.



Eyepiece Darkener Cap

Stock No. 7329-43 Each,

Slips on over regular eyepiece cap. Permits solar observations. Made for all Lietz transits and theodolites. Specify instrument model when ordering.



Zenith Eyepiece Prisms

Stock No. 7311-27 Each

Slips over the instrument eyepiece cap. Delivers image to approximately 70° vertical angle on BT Series, Model GT-60 and previous Model 10-B instruments. Please specify exact diameter of eyepiece cap, and instrument model. Complete with leather case.



7311-27



"A"



"B"

Stock No. 7311-28 Set

Set of two Zenith Prisms for telescope eyepiece "A" and circle reader microscope "B". Installed by removing regular eyepiece assemblies. Each delivers image at full 90° vertical angle. For TM-1A, TM-10C, TM-20C and T-60D Theodolites only. With leather case.

7311-28 Set of two ("A" and "B")

Stock No. 7311-29 Each,

Single Zenith Prism identical to Part "A" of 7311-28 Set — installed by removing the regular eyepiece assembly. Delivers image at full 90° vertical angle. For 10-C Transit only. With leather case.

Eyepiece Darkener Cap for Zenith Prism (Not illustrated)

Stock No. 7311-30 Each

For Zenith Eyepiece Prism 7311-29 (7311-28 Part "A"). Slips over eyepiece cap. For making solar observations.



Circular Compass

Stock No. 7311-14 Each,

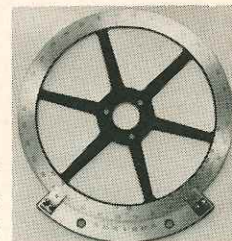
A highly accurate compass with viewing prism. (Circle reading to 1 degree.) Easy attached. Complete with leather case. Available for 10C or BT-20A Transit, TM-10C, TM-20C or T-60D Theodolite. Please specify.

Stadia Circle

Stock No. 7339-21 For Model 550, 625 Transits . . . Each,

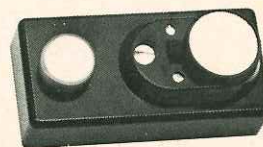
Stock No. 7339-22 For Model 10-C Transit Each,

The installation of the stadia circle and vernier permits simple reduction of stadia readings directly by use of the added scales. Installation requires the removal of the regular vertical circle and vernier which are replaced by the stadia types. Stadia circle must be installed in our factory, at an additional cost. Write for quotation.



7339-21

Night Illumination Battery Pack



Provides internal instrument illumination with adjustable intensity. Uses standard AA batteries. With leather case.

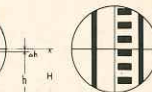
Stock No. 7311-12 Each

For TM-1A, TM-10C, TM-20C, T-60D Theodolites (Specify model). One battery pack (without case) is supplied as standard equipment with these instruments.

Stock No. 7311-15 Each

For B-1 Level only. Three piece kit, includes mounting bracket and screws, reticle illumination control mirror, and new rear instrument housing which replaces regular housing.

Parallel Plate Optical Micrometer



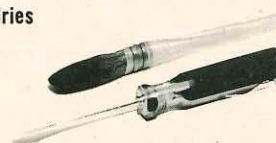
Stock No. 7372-14 Each,

Used to measure interval between the horizontal reticle line and nearest graduation on the rod to .001 feet. It is attached to objective end of level. For B-1 Automatic Level only. Supplied with a counterbalance weight for eyepiece end. Complete with leather case.

Stock No. 7372-15 Each

Same as above except metric model reading to 0.1 mm.

Sundries



Stock No.

Description

Each

- 7593-10 Lietz surveying instrument oil, 1 oz. bottle
- 7593-25 Steel adjusting pin, straight
- 7593-27 Steel adjusting pin, curved tip
- 7593-29 Spanner wrench for large plate level nuts
- 7593-30 Camel hair brush for cleaning instruments
- 7593-35 Instrument screwdriver (specify instrument)
- 7593-41 Waterproof hood for Lietz instruments, specify model

Lietz traverse equipment is a most versatile and functional component system to add to your theodolite for those precise triangulation surveys—day or night!

TRAVERSE SET

Consisting of the following:

Two No. 7312-40 Rotatable Sighting Targets mounted on a flanged base having $\frac{5}{8}$ x 11 female thread. Two level vials mounted on each base.

Two No. 7312-39 Illumination Units for attaching to targets when poor natural lighting prevails. Each unit is powered by two "C" size batteries.

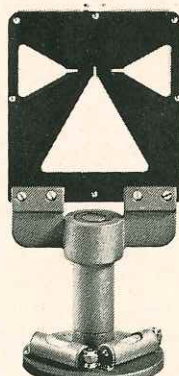
Two No. 7311-37 Tribrach Adapters
Two No. 7311-35 Optical Plummet Tribrachs
One Fitted Carrying Case

Stock No. 7312-45 Traverse Set Complete . . . Each,

Targets, adaptors, tribrachs and illumination units may be ordered separately — see price list.

Large target $8\frac{1}{4}$ x $11\frac{1}{4}$ attaches to regular target (No. 7312-40) to provide increased sighting range. (Not illustrated.)

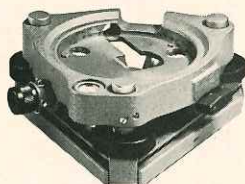
Stock No. 7312-42 Each,



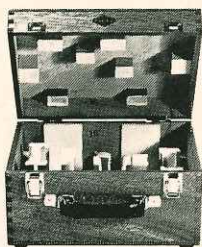
7312-40



7311-37

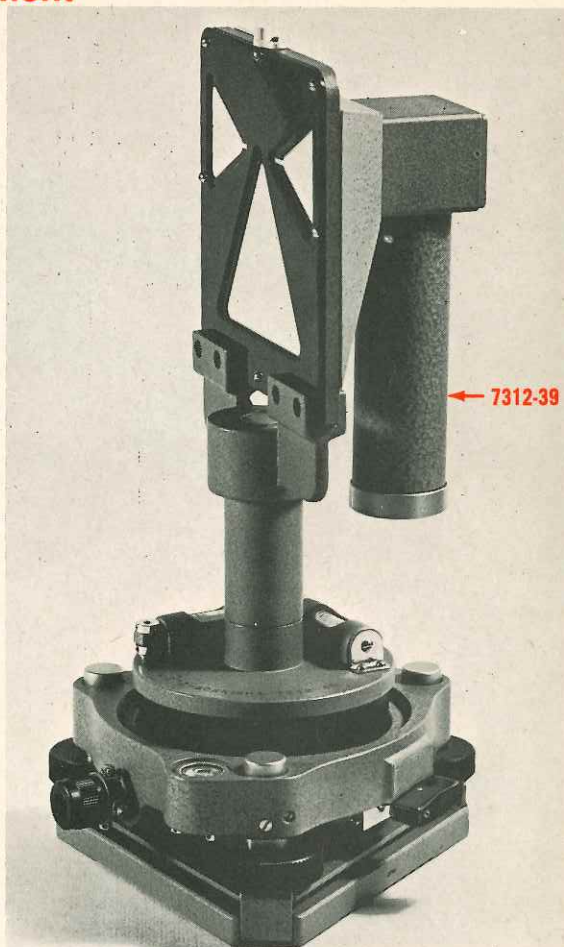


7311-35



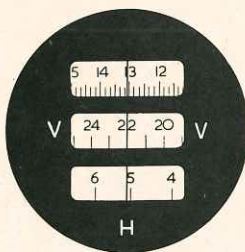
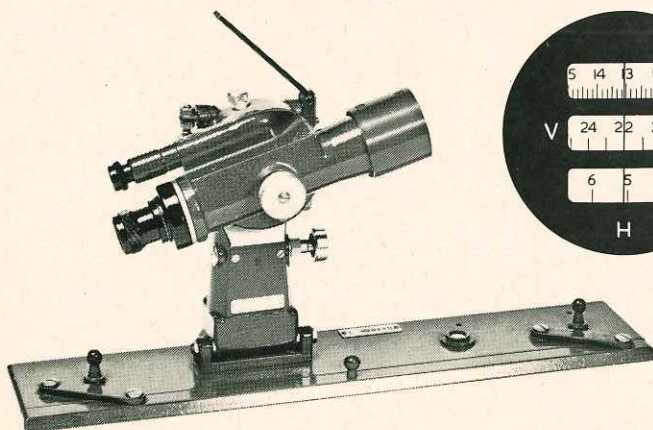
Fitted carrying case

Exploded view



Assembled unit with illumination part attached

Watts Microptic Alidade



The microptic alidade is a lightweight, yet accurate, instrument for use in plane table surveying. The vertical arc and Beaman scales are fully enclosed and are read through an eyepiece adjacent to the telescope eyepiece. By observing the scales, the instrument man can rapidly reduce the stadia readings to obtain the difference in elevation between instrument and level rod and the true horizontal distance of the rod.

Stock No. 7020-00 Mfr. No. SA100 Instrument only . . . Each

Telescope:

15x magnification. Objective aperture 1.22 inches (31 mm). Minimum focus 14 ft. (4.2 m). Stadia ratio 1:100. Circle reader magnification 20x. Telescope will transit through 360°. Inverted image.

Circle:

2 inch (51 mm) diameter graduated to 10 minutes on glass. Reading by estimation to one minute. Angles of elevation or depression of up to 45° can be measured. 0° is read when telescope is horizontal. Vertical and horizontal Beaman scales on glass.

Levels:

Circular bubble on blade for rough leveling. Horizontal vial on housing for leveling the instrument. Vertical or altitude vial with sensitivity of 40 seconds per 2 mm for referencing the circle. Vertical vial is viewed through a hinged mirror.

Construction:

15 inch blade with parallel rule, offset from optical axis 0.45 inch. Height of optical axis above plane table 5.15 inches.

Equipment:

Wood carrying case, sunshade, screwdriver, spanner wrench, instruction book.

Weight:

Instrument $4\frac{1}{2}$ lbs. Case 8 lbs.

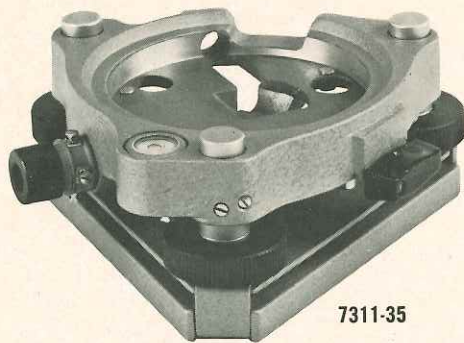
Accessories:

Stock No. 7020-10 Mfr. No. SF-17
60° prism attachment for telescope.
Stock No. 7020-15 Mfr. No. SA-25
Prism attachment for circle reader.
Stock No. 7020-25
24 x 30 inch plane table board.

Stock No. 7020-26
Canvas case for board.
Stock No. 7020-30
Tilting head (Johnson type) extension leg tripod.



EDM Accessories



7311-35

TRIBRACH WITH OPTICAL PLUMMET

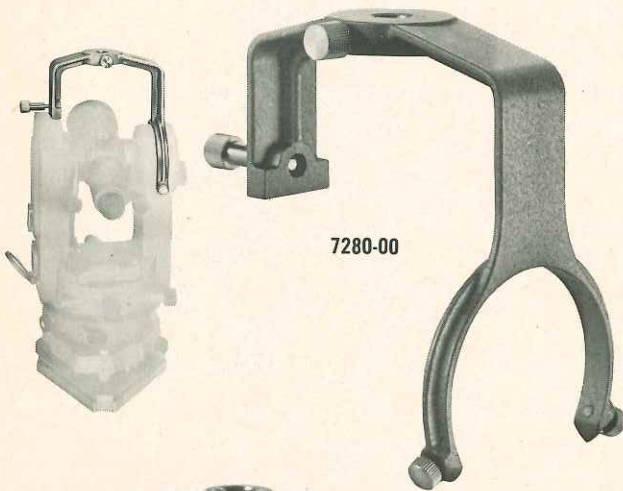
For precision plumbing of instruments and accessories. The Lietz tribrach will accept Models TM-1A, TM-10C, TM-20C and T-60D Theodolites (although each of these instruments has an optical plummet in the alidade section) as well as Wild Theodolites.

Electronic Distance Measuring Systems manufactured by Hewlett-Packard, AGA, Cubic, Tellurometer and others, as well as all equipment and accessory items fitting the Wild GDF-6 tribrach will mount directly into this tribrach.

Base plate has standard $\frac{5}{8}$ " x 11 threads and circular level vial with sensitivity of 10 minutes per 2 mm.

Optical plummet focus by push-pull slide focus. Range 1 ft. to infinity.

Stock No. 7311-35 Each,



7280-00

EDM MOUNTING BRACKET

Attaches to Lietz Theodolite TM-10C or TM-20C allowing installation of any lightweight EDM aiming head. Specially designed to accept Tellurometer CD-6 EDM System. Top surface of bracket is 40 mm in diameter with a 12 mm diameter center opening for EDM yoke stem. Thumb screw secures EDM device to mounting bracket. Design permits quick and easy installation and removal. Gray enamel finish.

Stock No. 7280-00 Each,

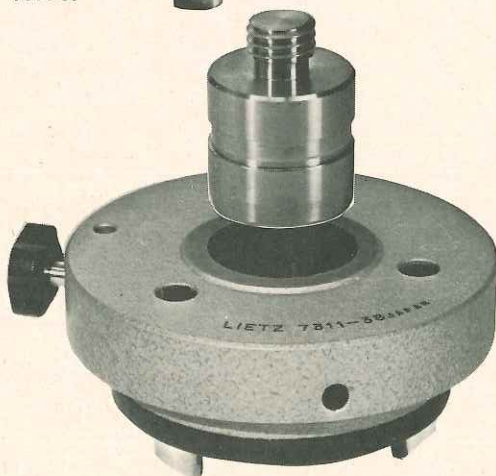


7311-37

TRIBRACH ADAPTER

Adapter from $\frac{5}{8}$ " x 11 thread to Lietz or Wild tribrach. Allows installation of Lietz Retro Prism or other $\frac{5}{8}$ " x 11 female thread accessories into tribrach.

Stock No. 7311-37 Each,



7311-38

TRIBRACH ADAPTER

Similar to 7311-37 except with rotatable center. Removing center section allows installation of Zeiss, Askania or Franke theodolites and accessories.

Stock No. 7311-38 Each,



Corner Cube Retro Prism



For use with light, laser or infra-red electronic distance measuring systems. Ruggedly built, beautifully finished, solid one-piece construction for highest precision and outstanding performance. Each prism quickly demountable from housing. Triple unit housing sides are drilled and threaded permitting assembly of multiple units without the need of any special mounting brackets. 4 3/4" sighting pole included with each triple and single unit. Lietz retro prisms are completely compatible for use with AGA Geodimeter, Hewlett-Packard, Kern, Rangemaster, MicroRanger, Tellurometer and all other EDM systems which employ round, co-axial type prisms.

SPECIFICATIONS:

Each prism is precision ground from one solid piece of optical glass. Full aperture type construction. 2 7/8" (73 mm) face diameter. ± 2 arc seconds precision

Flatness not to exceed 1 1/2 fringes as measured on an interferometer.

Prism offset for both triple and single units is -30 mm (-0.10 ft.).

When used with the following EDM systems, measurements are corrected as follows:

AGA Geodimeter Model 76* and 700*:	-30 mm (-0.10 ft.)
Hewlett-Packard Model 3800 and 3805:	None
Kern Model DM-1000:	None
Rangemaster (Laser Ranger):	None
MicroRanger:	None
Tellurometer MA-100:	Varies with each instrument

Aluminum alloy housing finished in international orange enamel. Base and sides drilled with 5/8" x 11 thread. Top has 5/8" x 11 stud and lock nut to permit assembly of multiple units.

Weight of single unit in housing 2 lb. 4 oz.

Weight of triple unit in housing 5 lb. 2 oz.

*Use No. 7270-40 adapter.



7270-31

Triple Prism with Mount and Sighting Pole Each,



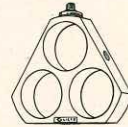
7270-32

Single Prism with Mount and Sighting Pole Each,



7270-35

Retro Prism only Each,



7270-33

Triple Mount only Each,



7270-34

Single Mount only Each,



7270-36

Plastic Lens Cap Each,



7270-37

Retainer Screw for Retro Prism Each,



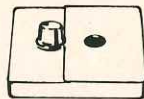
7270-38

Lock Nut Each,



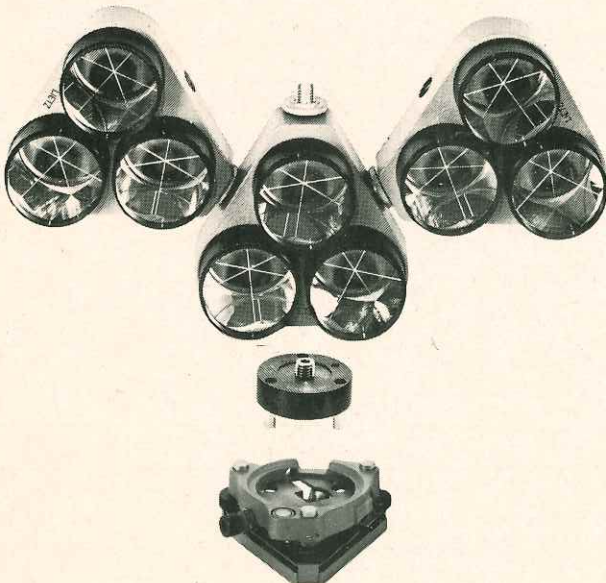
7270-39

Sighting Pole Each,



7270-40

Retro-Prism Offset Adapter Permits use of AGA Geodimeter EDM systems without applying correction factor Each,



Exploded view showing a 3 triple Retro Prism Assembly with the Lietz Optical Plummet Tribrach and Tribrach Adapter.

RETRO PRISM CARRYING CASE



Vinyl plastic carrying bag with full zipper for easy access and storage of retro prisms. Inside of bag is padded to protect prism against shock and abrasion. Exterior vinyl is high visibility international orange color. Each bag has sturdy nylon carrying strap. Available in two types to accept either triple or single units. Lateral type retro reflectors may also be stored in these cases.

7270-51 Carrying case for triple unit Each,
7270-52 Carrying case for single unit Each,



San Francisco Rods (3 Section)

Lietz San Francisco Metalface Level Rods are of selected, seasoned, straight-grain hardwood. The steel faces have graduations and numbers bonded to eliminate corrosion or chipping.

Graduations are sharp with high contrast. Small foot numbers between 3rd and 4th, and between 6th and 7th tenths of foot numbers. Divisions are to feet, tenths and hundredths.

A great advantage of the Lietz San Francisco Metalface Rods is their easy portability. They are light and effortless to handle with positive-action snap locks and clamps on all sections for dependable accuracy. All fittings are finished in hard-wearing "gold" epoxy resin. Individually cartoned.

See Inside
Back Cover
for Rod
Faces

8071-52

Intermediate
Identifying
Foot
Numbers

8071-53

Protective bridge eliminates
sharp edges — prevents
snagging and damage.

METALFACE SAN FRANCISCO RODS (NATURAL FINISH)

Stock No.	Description	Each
8071-52	4½ ft. Rod — extends to 12 ft. Non-glare yellow. 6½ lbs.	
8071-53	4½ ft. Rod — extends to 12 ft. White face. 6½ lbs.	
8071-54	Replacement Faces for above. Non-glare yellow	
8071-55	Replacement Faces for above. White	
8071-57	1.37 meter Rod — extends to 3.65m. Non-glare yellow. 6½ lbs.	
8071-59	Replacement Faces for above (metric). Non-glare yellow.	
8071-62	5½ ft. Rod — extends to 15 ft. Non-glare yellow. 7 lbs.	
8071-63	5½ ft. Rod — extends to 15 ft. White face. 7 lbs.	
8071-64	Replacement Face for above. Non-glare yellow	
8071-65	Replacement Face for above. White	
8071-67	1.64 meter Rod — extends to 4.57m. Non-glare yellow. 7 lbs.	
8071-69	Replacement Face for above (metric). Non-glare yellow	

METALFACE SAN FRANCISCO RODS (STAINED FINISH)

Stock No.	Description	Each
8081-53	4½ ft. Rod — extends to 12 ft. White face. 6½ lbs.	
8081-55	Replacement Faces for above.	
8081-63	5½ ft. Rod — extends to 15 ft. White face. 7 lbs.	
8081-65	Replacement Faces for above. White	

All rods are individually cartoned. (Cases are extra for S.F. Rods.)

8071-56	Canvas Case for 8071-52, 8071-53, 8071-57, 8081-53
8071-66	Canvas Case for 8071-62, 8071-63, 8071-67, 8081-63



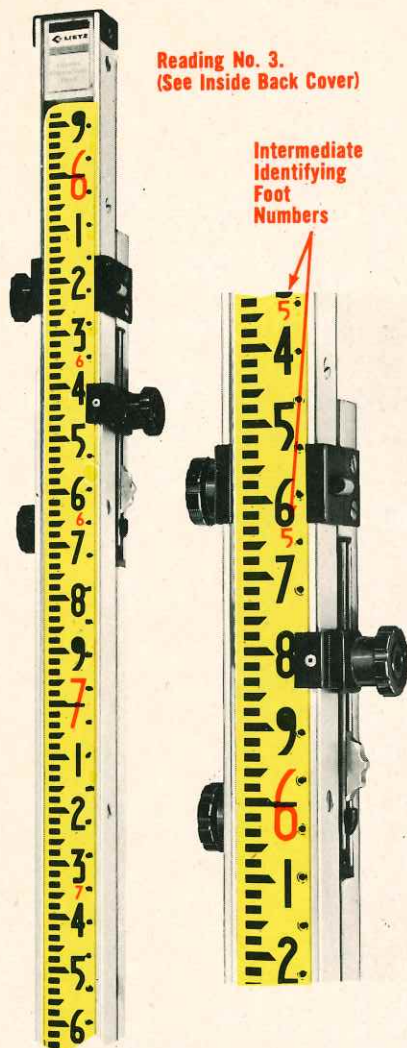
Non-Glare Yellow Face

Substantial savings in time plus increased accuracy are possible with this direct-reading, self-computing rod used to obtain elevations directly. Errors in computation are eliminated since only two columns (station and elevation) are needed in the notebook. No reduction of notes is necessary since each reading is an elevation.

Made of two 5-foot sections of maple. The upper, or face, section carries a ten-foot endless band graduated in feet, tenths and hundredths. The band can be locked in any position. Faces are famous Lietz non-glare yellow. Rods come with fabric carrying case and are individually cartoned.

Reading No. 3.
(See Inside Back Cover)

Intermediate
Identifying
Foot
Numbers



8076-00

Stock No.	Description	Each
8076-00	Direct Elevation Rod with case. 6 lbs.	
8076-05	Replacement Ribbon for No. 8076-00	
8076-06	Extra Carrying Case (fits 8076-00, 8076-10, 8076-20, 8076-30)	
8076-07	4-foot Rod Extension (fastens to base of rod)	
8076-08	Target	

INVERTING DIRECT ELEVATION ROD

Same construction and specifications as described above, but for use with instruments having inverting telescopes.

Stock No.	Description	Each
8076-10	Inverting Direct Elevation Rod with case. 6 lbs.	
8076-15	Replacement Ribbon for No. 8076-10	

"CUT AND FILL" ROD

Similar to the Elevation Rod being equipped with a 10-ft. endless band graduated in feet and 10ths of feet. There are two sets of figures—numbered each alternate 10th each way from 0/0—with black figures reading up and red figures reading down. Black figures are used when readings show the point or station to be in "cut" and the red figures used when "fill" is indicated. The readings thus show the amount of fill or cut directly.

Stock No.	Description	Each
8076-20	Cut and Fill Rod with case. 6 lbs.	
8076-25	Replacement Ribbon for No. 8076-20	

Note: Replacement ribbons or bands for No. 8076-00 and No. 8076-20 are interchangeable.

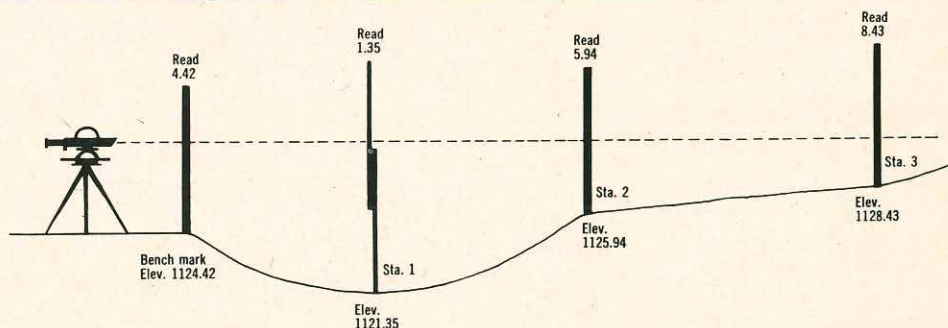
METRIC DIRECT ELEVATION ROD

Identical to No. 8076-00 except that it has a continuous band exactly three meters in length color-coded with one meter shown in red blocks. The one-meter sections above and below the red section are black and are marked plus (+) or minus (—) to indicate higher or lower elevations. Initial settings are always made on the red section thereby establishing the true relationship of all subsequent readings.

Stock No.	Description	Each
8076-30	Direct Elevation Rod, Metric, with case. 6 lbs.	
8076-35	Replacement Ribbon for 8076-30	

Note: Replacement ribbon is not interchangeable with 8076-00.

THE DIRECT ELEVATION ROD IN USE



1. Hold rod on the bench mark—assumed elevation 1124.42 feet. (Prefix 112) 4.42.

2. Release clamp and move the graduated rod band until level cross hair intersects 4.42 on the rod. Note: the rod face is numbered downward.

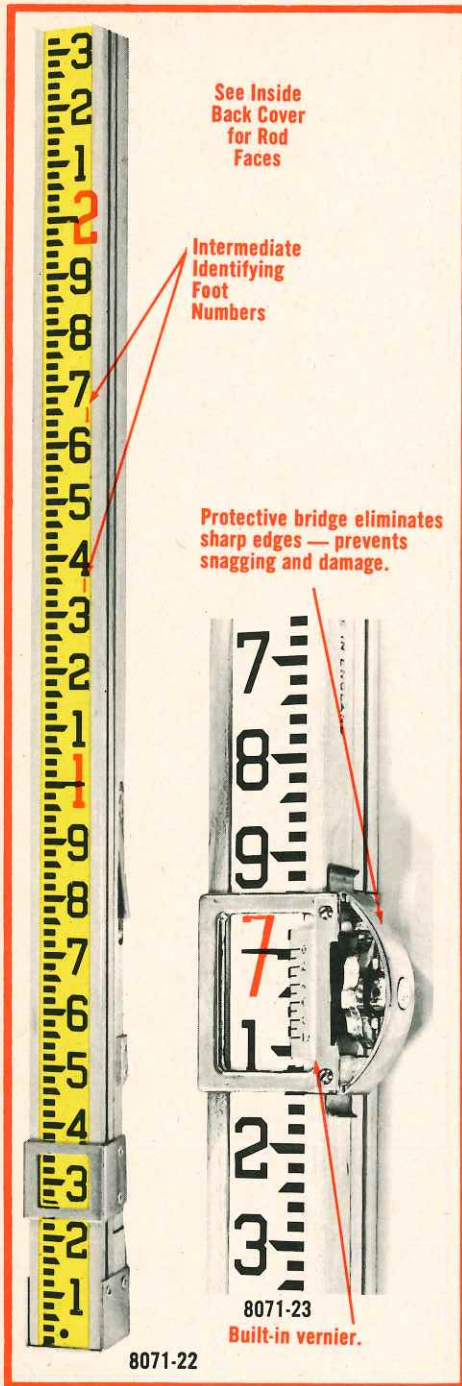
3. Move the eyelet latch so as to engage the two prongs in the band eyelets and then tighten clamp knob which locks the band to the lower or back section of the rod. The top or front section can now be raised or lowered without changing the rod reading.

4. With the band thus fixed, all subsequent rod readings from this instrument

set-up will be true elevations. It may be necessary to extend or shorten the rod in order to bring the rod face into the view of the levelman. So doing does not change the distance from the point 4.42 to the bottom of the rod.

At Sta. 1 (see sketch) assume the instrument man reads 1.35 on the rod. The recorded elevation will be 1121.35 by using prefix 112. At Sta. 2, with rod reading 5.94, record elevation 1125.94 and at Sta. 3 with rod reading 8.43 record elevation 1128.43.

5. At turning points, proceed as outlined for bench marks, by resetting the band to the turning point elevation as read by the instrument man.



Accuracy and long life are built into Lietz metalface rods through precise fabrication combined with durable materials.

The body of the rod is selected, seasoned straight-grain hardwood available in either natural or stained finish. The face is a strip of steel with the graduations and numbers bonded to the surface so that there is no corrosion or chipping. Replacement faces are available and are easily replaced without special tools. Sections are firmly secured by snaplocks.

Black graduations are sharp with high contrast and are arranged for instantaneous reading with small red foot numbers between the 3rd and 4th, and 6th and 7th tenth of foot numbers. The divisions are to feet, tenths and hundredths. On the Philadelphia rods there is a vernier reading to thousandths of a foot. Only Natural finish Philadelphia rods are available in metric graduation as listed below. The Metalface rods are available in exclusive Lietz Non-Glare Yellow or with white faces. All fittings are finished in hard-wearing "gold" epoxy resin.

METALFACE PHILADELPHIA RODS (NATURAL FINISH)

Stock No.	Description	Each
8071-22	7 ft. extending to 13 ft. Rod only — non-glare yellow. 6½ lbs.	
8071-23	7 ft. extending to 13 ft. Rod only — white face. 6½ lbs.	
8071-24	Set of replacement faces only. Non-glare yellow	
8071-25	Set of replacement faces only. White	
8071-32	2.2 meters extending to 4.0m. Rod only — non-glare yellow. 6½ lbs.	
8071-34	Set of metric replacement faces only. Non-glare yellow	

All rods are individually cartoned — cases are extra — see below.

METALFACE PHILADELPHIA RODS (STAINED FINISH)

Stock No.	Description	Each
8081-23	7 ft. extending to 13 ft. Rod only — white face. 6½ lbs.	
8081-25	Set of replacement faces only. White	

LIETZ NON-GLARE YELLOW

Field tests have proven conclusively that Non-Glare Yellow faces are easier to read under all lighting conditions and at all distances. Order your next rod with Lietz Non-Glare Yellow and see!

CARRYING CASES FOR LEVEL RODS

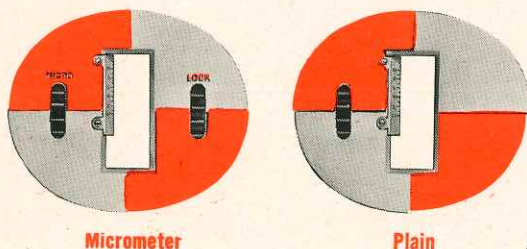
Greatly prolong life and assure greater accuracy through unmarred faces. Heavyweight canvas with leather reinforcing.

Stock No. 8071-26	Canvas Case for 8071-22, 8071-23, 8071-32, 8081-23	Each
-------------------	--	------

TARGETS FOR PHILADELPHIA RODS

High legibility is attained in these targets through distinct red and white quadrant markings. Vernier scales are set to avoid parallax.

The micrometer target allows fast, accurate settings since it can be raised or lowered by means of a thumb wheel before being clamped. Target verniers read to thousandths of a foot or to 1 mm.



Stock No.	Description	Each
8071-27	Plain target for rods in feet and tenths	
8071-28	Micrometer target for rods in feet and tenths	
8071-37	Plain target for rods in metric	
8071-38	Micrometer target for rods in metric	



Level Rods

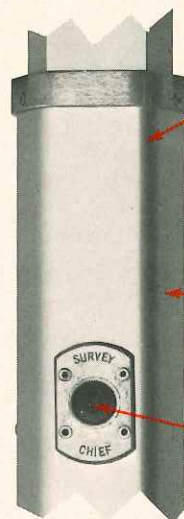
Survey Chief Leveling Rod

A precision rod manufactured from high quality extruded aluminum to exacting standards of workmanship and accuracy. Three sliding telescoping sections 74 inches in length closed, extending to 16 feet.

Stock No. 8072-60 Each,

Reinforced canvas case for Survey Chief

Stock No. 8072-65 Each,



ACCURATE GRADUATIONS

Graduations are screened then stove-enamelled and polyurethane-coated for maximum abrasion resistance. Temperature correction tables on each rod.

CURVED BACK SECTION

For ease and comfort when carrying.

CAST ALLOY COLLAR

Cap, collars and shoe are made of cast alloy for maximum protection.

NYLON BEARINGS

Nylon bearings, fixed in guides assure rigidity and smooth operation. Not affected by hygroscopic conditions.

LARGE, POSITIVE BUTTON LOCK

Assures ease of operation and positive locking.

CONSTANT FACE WIDTH FULL LENGTH OF ROD

DOVETAILED, ENCLOSED RUNNERS



Chicago Style Level Rods

Chicago-style leveling rods are made of select hardwood. The accurately-painted face has black graduations and red figures on a white background. Sides and back are finished in gray enamel.

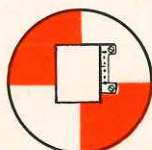
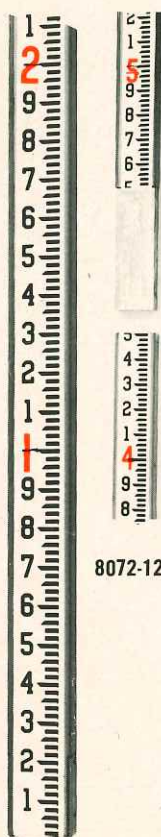
The face is 1½ inches wide and graduated in feet, tenths and hundredths. The rod sections are joined by friction-type, slide-fit brass joints and form a continuous and unbroken face that retains its accuracy under all conditions.

Stock No. 8072-12 12½ ft. in 3 sections. With canvas case Each,

Stock No. 8072-16 16½ ft. in 4 sections. With canvas case Each,

Stock No. 8072-19 Target with vernier reading to .001 ft.

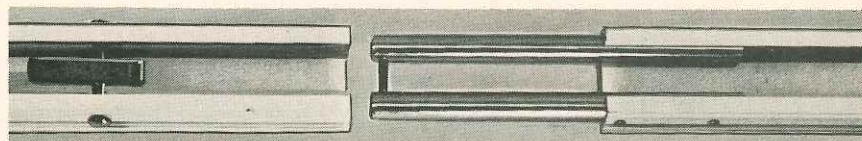
Fits No. 8072-12 and 8072-16 Each,



8072-19

8072-12

ALUMINUM ALLOY CHICAGO STYLE LEVEL RODS



Similar to Chicago-style Rods described above, but made of aluminum alloy finished in hard-wearing white epoxy resin; black graduations, red figures. The three sections are joined by friction-type joints which are locked securely by spring-loaded catches. Suitable for use in water or areas of excessive moisture.

Stock No. 8072-13 12½ ft. in 3 sections. With canvas case . . . Each,

Stock No. 8072-14 4 meter in 3 sections. With canvas case . . . Each,

Stock No. 8072-17 16½ ft. in 4 sections. With canvas case . . . Each,



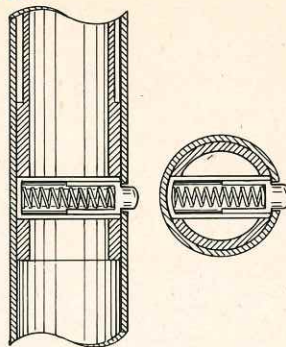
Rods

25 Ft. Fiber Glass Leveling Rod

An extra-light leveling rod — weighing only 4 lbs., which is widely used by telephone companies, foresters and leading railroads. It will telescope into a 5-foot barrel, and secure locking devices prevent movement of sections.

The barrels are painted with an extremely tough, white epoxy enamel and the scale is later covered with a clear polyurethane coating. Has excellent readability—the figures being the same size on each barrel. Foot marks in red; 10ths and 100ths in black. Size of largest barrel, 1.670 inches.

This fiber glass rod is not affected by extreme temperatures; will not warp, check, split, chip or swell; and the joints will not jam or spur. It will not sway in the wind and may be used in water with appropriate care. Fiber glass has high insulating qualities as well.



Cross-sections showing the spring-biased locking button in an extended position. Note the tension applied by the collar on the inside of the section. This prevents movement of the section when the pin is extended.

Stock No. 8073-25	Mfr. No. LR25	Each,
Stock No. 8073-27	Mfr. No. LR25 Metric — 7.6 meters. Graduated meters, decimeters and centimeters	Each,
Stock No. 8076-06	Cloth case for 8073-25, 8073-27	Each,

LIETZ Builders and Architects Rods



8075-80

Two-section, eight-foot Maple rod with impressed black graduations on white painted face. Red foot marks and smaller intermediate red foot marks. Sections connected by positive locking bayonet type slip-fit joint. Individually cartoned.

Stock No.	Description	Each
8075-70	Feet, inches, eighths	
8075-72	Feet, 10th, 100ths	

Two-section, eleven-foot Maple rod with painted black graduations on white face. Red foot marks. Rod consists of two sliding sections 6 foot (collapsed) sliding to 11 foot fully extended. With metal fittings and shoe.

Stock No.	Description	Each
8075-80	Feet, inches, eighths	
8075-82	Feet, 10th, 100ths	

FOR DESCRIPTION OF DAVID WHITE RODS AND TARGETS, SEE PAGE 20

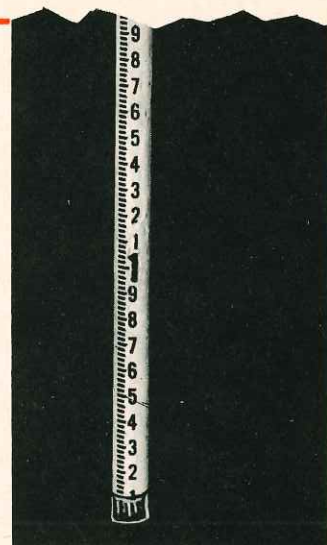


8075-72

Intermediate
Identifying
Foot
Numbers



8073-25



8 Foot Builders Rods with Scotchlite Face

Made of select wood with quality construction throughout, these rods have a swivel joint with brass fittings. Folded length is 52 inches extending to 98½ inches. Clearly marked graduations are sealed with Scotchlite reflective sheeting providing the ability to illuminate the rod face in tunnels, mines or other dark working areas with an ordinary flashlight at distances up to 300 feet. Scotchlite covered face is unaffected by dampness or water.

Stock No. 8075-75	8 ft., 2 section, graduated feet, inches, ½ inches	Each,
Stock No. 8075-76	8 ft., 2 section, graduated feet, 10ths, 100ths ft.	Each,
Stock No. 8075-77	High visibility plastic case for above	Each,



8075-76



Stadia Rods

Made of selected and seasoned silver spruce with sharp, clear graduations in the Lietz pennant pattern which is unsurpassed for stadia reading at long distances. Numerals are red with black graduations against a white ground. The face is sealed to withstand weather and wear. The back and sides of the rods are finished in white. The rod is $2\frac{7}{8}$ inches wide. Sections fold with self-locking steel hinges operated by pushbuttons as illustrated for positive, rigid, full-length extension. Individually cartoned.

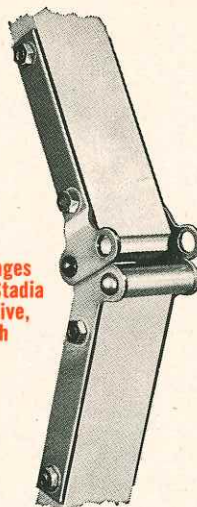
Stock No. 8074-42	12 feet long; two fold	8½ lbs.	Each,
Stock No. 8074-43	16 feet long; four fold	12 lbs.	Each,
	with fold-out steadying handles.		
Stock No. 8074-52	4 meter; two fold.	8 lbs.	Each,
Stock No. 8074-53	5 meter; four fold.	12 lbs.	Each,
	with fold-out steadying handles.		

ALUMINUM STADIA RODS

Similar to above but of aluminum alloy with self-locking steel hinges operated by pushbuttons. Finished in hard-wearing white epoxy resin. Suitable for use in water or areas of excessive moisture. The accurately-painted face is 2" wide with black graduations and red numerals, reading to 0.1 foot.

Stock No. 8074-62	13 feet long; two fold.	8 lbs.	Each,
-------------------	-------------------------	--------	-------

Push-button hinges lock the Lietz Stadia Rods into positive, rigid, full-length extension.



Available with readings No. 4 and No. 5 (See Inside Back Cover)



8074-42



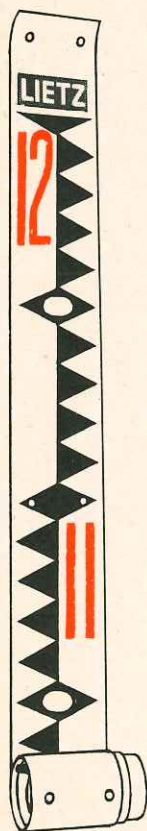
Flexible Stadia Level Rod Faces

Sharp, clear graduations in the Lietz diamond pattern which is unsurpassed for stadia reading at long distances. Numerals are red with black graduations against a white ground. Width is $2\frac{3}{4}$ inches with readings to tenths & half-tenths. Printed on special polyester material, it can be rolled up to fit in a can $1\frac{1}{2}$ inches in diameter and three inches high. Weight 3 ounces. Punched with eyelets for attachment to board.

Stock No. 8075-10	Lietz Flexible Stadia Rod Face. 12 ft. long	Each,
-------------------	---	-------

OTHER FLEXIBLE LEVEL ROD FACES

Stock No. 8075-30	Flexible Level Rod Face. 12½ feet long, 1½ inches wide; graduated to 100ths of feet	Each,
Stock No. 8075-31	Same as 8075-30 except 16½ feet long	Each,
Stock No. 8075-40	Flexible Level Rod Face. 12½ feet long, 1½ inches wide; graduated in feet, inches, eighths	Each,



8075-10



8075-30

8075-40



ROD LEVEL

Determines quickly and accurately if level rod is being held perpendicular.

Circular spirit level vial is easy to see under all conditions. Vial is securely mounted in a metal head with a $\frac{3}{8}$ inch protective rim to guard against breakage. Head is adjustable so that a true level can be maintained at all times. A $3\frac{3}{8}$ inch right angle blade with an angle slot supports the head and gives proper contact against the level rod.

The vial housing is white, while the bracket is bright red for easy location in brush and grass.

Stock No. 8071-90	Each,
-------------------	-------

LIETZ Range Poles

WOOD RANGE POLES

Round poles made from seasoned, selected wood that will not twist or warp. Ten-inch steel-tipped metal shoe securely fixed by two rivets. Divided in feet; alternately painted red and white. Diameter, 1 1/8 inches.

Stock No. 8078-16 6-foot Each,
Stock No. 8078-18 8-foot Each,

DURALINE SCREW JOINT RANGE POLE

Made of aircraft aluminum tubing that can't warp or fracture. The alternating plastic 12" color sections bonded onto the aluminum won't mar or chip even under the toughest field conditions. "International Orange" and white pigments are impregnated throughout the entire material, to resist fading and weathering. Pole consists of two 1 1/4" diameter 4-foot sections with 5/8" x 11 thread joints for quick and easy assembly. One section has a replaceable hardened-steel point. Furnished in 3-pocket carrying case.

Stock No. 8078-48 Range Pole 8 ft. Each,
Stock No. 8078-49 Extra 4' Section Each,

METRIC DURALINE RANGE POLE

Same construction as listed above except pole consists of two 1.25 meter sections. Alternating 500mm red and white color sections.

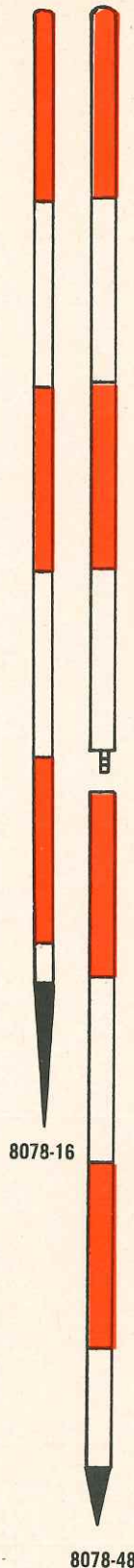
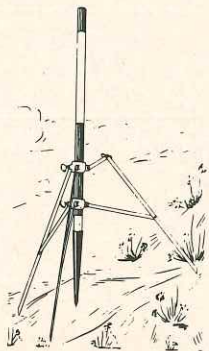
Stock No. 8078-42 Range Pole 2.5 M Each,
Stock No. 8078-43 Extra 1 M Section Each,

Stock No. 8078-50 Replacement Point Each,
For 8078-48, 8078-42

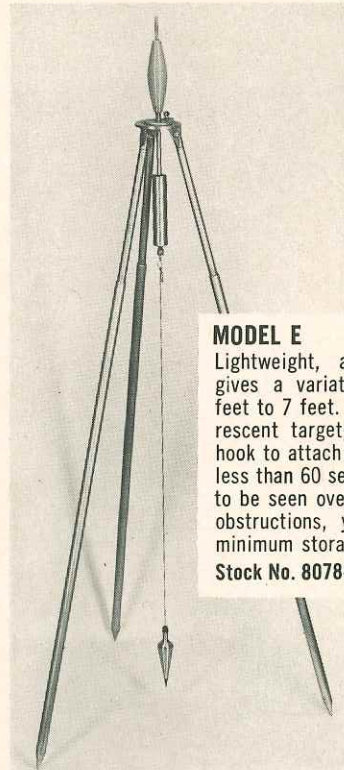
RANGE POLE SUPPORT

Ruggedly made with metal center castings. Legs are made of rustproof steel and one of them is adjustable for use on uneven ground.

Stock No. 8078-90 Each,



ULTRA-SITE TRIPODS WITH HEADS AND TARGETS



MODEL E

Lightweight, adjustable metal tripod gives a variation in height from 3 1/2 feet to 7 feet. Adjustable head has fluorescent target; 12-inch pendulum with hook to attach to plumb bob. Sets up in less than 60 seconds and is high enough to be seen over brush, traffic and other obstructions, yet compact enough for minimum storage space.

Stock No. 8078-12 Model E Each,



MODEL C

Lightweight 5-foot metal tripod with adjustable head and pendulum and fluorescent target. When set, target is approximately 5 feet, 8 inches above the surface. Weight approximately 8 pounds.

Stock No. 8078-10 Model C Each,

METAL TUBE CONTAINER

Sturdy galvanized metal tube container with aluminum cap to hold No. 8078-12.

Stock No. 8078-11 Each,
REPLACEMENT FLUORESCENT TARGET
Stock No. 8078-15 Each,

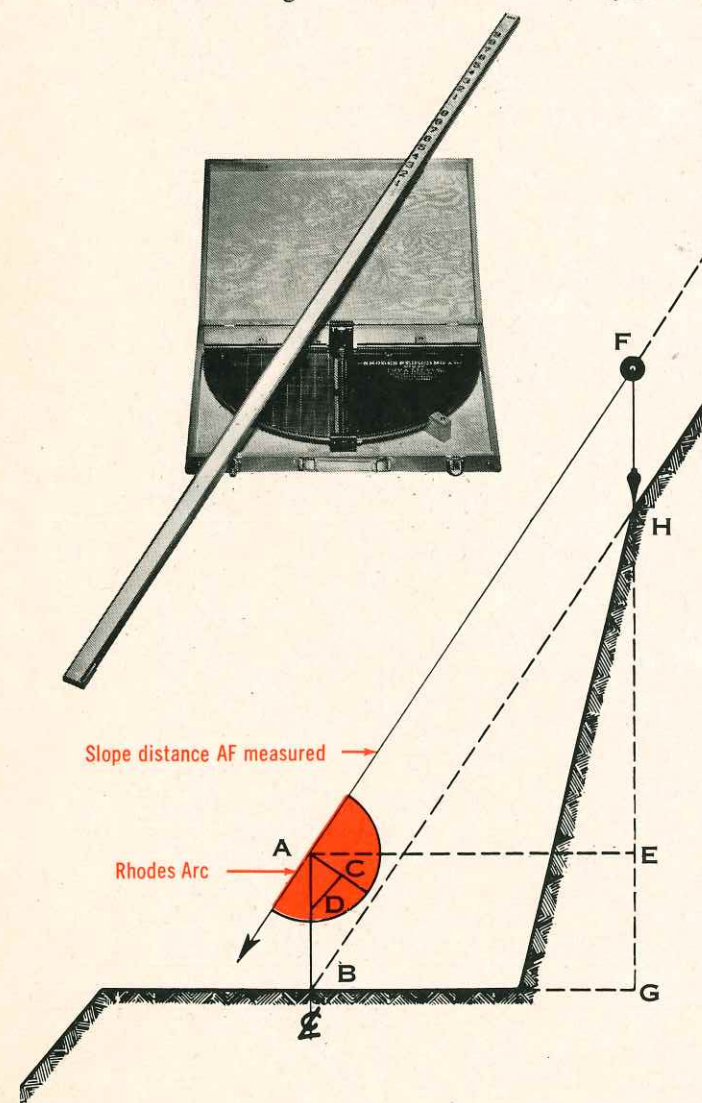
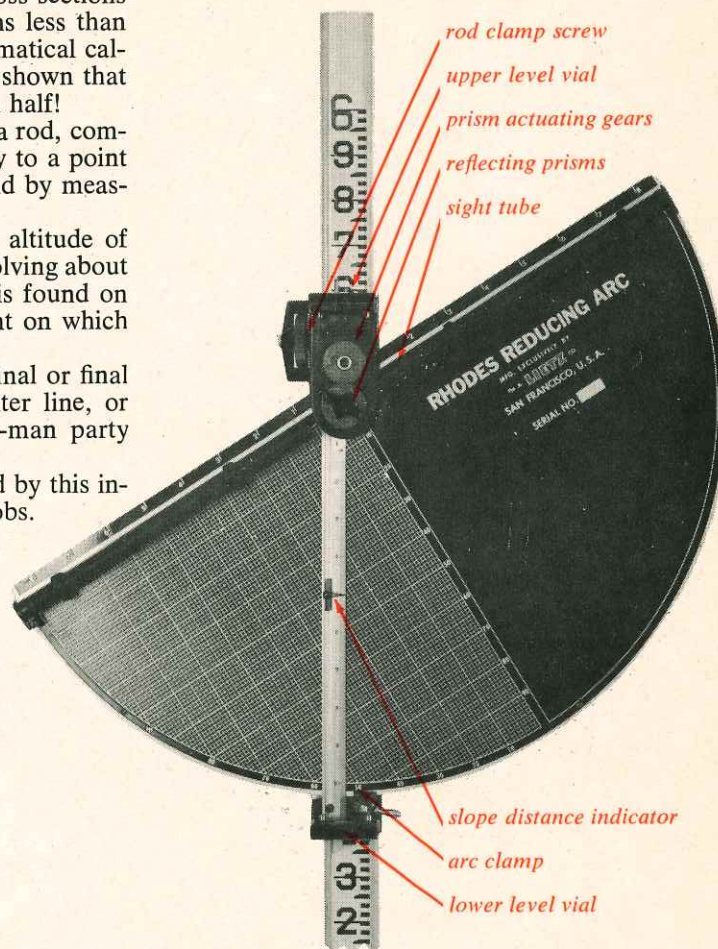
The Rhodes Reducing Arc replaces the transit in taking cross-sections by slope angles and slope measurements. The instrument weighs less than seven pounds and can be instantly set up. By eliminating mathematical calculations, it reduces the possibility of error, and experience has shown that the work of taking cross-sections in rough country can be cut in half!

This instrument consists of a simple arrangement of scales on a rod, combined in such a manner that distances vertically and horizontally to a point are readily obtained graphically when the slope distance is found by measurement.

Horizontal and vertical distances, representing the base and altitude of a right angled triangle, are read from scales on a movable arc revolving about a center of definite height. The slope distance, or hypotenuse, is found on the fixed vertical scale. Revolving the arc and sighting the point on which the elevation is desired determines the vertical angle.

The Rhodes Reducing Arc can be used equally well for original or final cross-sections, setting slope stakes, reference points from center line, or re-establishing the center line from reference points. A three-man party can efficiently handle the work in mountainous, rugged country.

Probably the most substantial saving of engineers' time offered by this instrument is that of setting construction stakes on heavy grading jobs.



In all uses, the Arc itself is mounted on the graduated rod and secured by the "rod clamp screw", thus giving the height of the instrument above the ground. The operator holds the rod vertical by reference to the upper and lower level vials.

Taking cross section data is a fast and simple operation with the Rhodes Arc. Only two men, the operator and the chainman, are needed. At the point to be shot, the chainman holds the zero end of the chain at the same height above the point as the HI of the Arc. This is easily done with a level rod or a plumb bob. The chain should be held taut. This measures the slope distance from the instrument to the point. The operator then sights through the sight tube to the level rod or the zero end of the chain being held over the point. This brings the sight tube parallel to the slope of the ground. The operator reads the slope distance on the chain and sets this on the slope distance indicator scale of the Arc. He then reads the vertical and horizontal distances directly from the respective scales on the Arc.

Write for brochure fully describing Rhodes Reducing Arc and showing its uses and benefits.

Stock No.	Description	Each
7861-00	Rhodes Reducing Arc, feet, in wooden case with rod . . .	
7861-05	Rhodes Reducing Arc, metric, in wooden case with rod . . .	
7861-10	Extra rod, feet . . .	
7861-15	Extra rod, metric . . .	
7861-11	Replacement Face for rod, feet . . .	
7861-16	Replacement Face for rod, metric . . .	

In solving the triangle HBG, we have $AF = BH$ and $AE = BG$. The triangle $FAE = HBG$.

The triangle HBG is also graphically represented on the Rhodes Arc by the triangle DAC where $BH = AD$, $BG = AC$, and $HG = DC$.



Pocket Transit (Brunton type)

A precision combination instrument that will perform practically all surveying functions and is widely used for preliminary surveys. 2 1/8 in. needle with a jeweled pivot. Circle graduated to degrees; clinometer arc graduated 0-90° both directions with a vernier arm reading to 10 min. A velvet-lined leather case with a belt loop is furnished with each instrument.

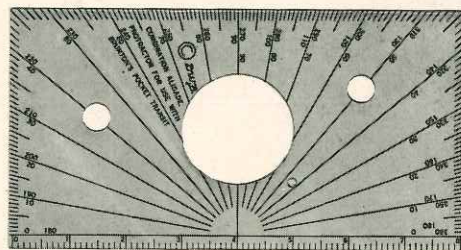
Stock No.	Description	Each
8026-50	Instrument with circle 0-360° with case	
8026-51	Instrument with circle 0-360° with case—damped	
8026-55	Instrument with circle in quadrants with case	
8026-56	Instrument with circle in quadrants with case—damped	

ACCESSORIES FOR LIETZ POCKET TRANSITS

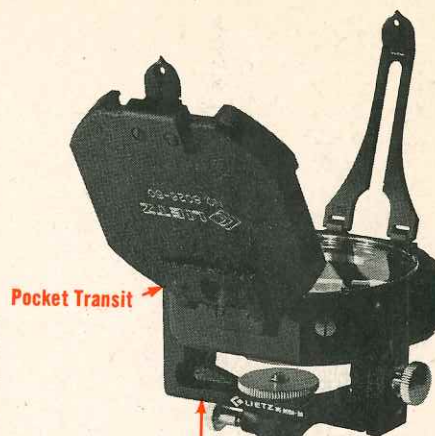
8026-60	Leather Case only (with belt loop)
8026-61	Leather Case (with sling strap)
8026-22	Ball and Socket Head including removable thimble. Head can be used with either Jacob Staff or Tripod—complete with leather carrying case with belt loop
8026-23	Ball and Socket Head only—without case
8026-64	Leather Case only—with belt loop—to hold Ball and Socket Head and Thimble
8026-33	Collapsible Aluminum Metal Tripod — grey enamel finish. Extends to 53 inches. In canvas carrying case with sling strap. (Illustrated on Page 37).
8022-54	Jacob Staff—5 ft. long—Hardwood with metal shoe and tapered head to fit thimble in Ball and Socket Head
8022-56	Telescoping Jacob Staff — Tubular aluminum adjusts in four steps from 21 to 64 inches. Upper end is tapered with 1/4 x 20 thread for attachment directly to ball & socket head, No. 8026-15 series rangefinders and most cameras. In canvas carrying case.
8026-28	Alidade Protractor combines with the pocket transits to make a portable alidade for use on a plane table



8026-50



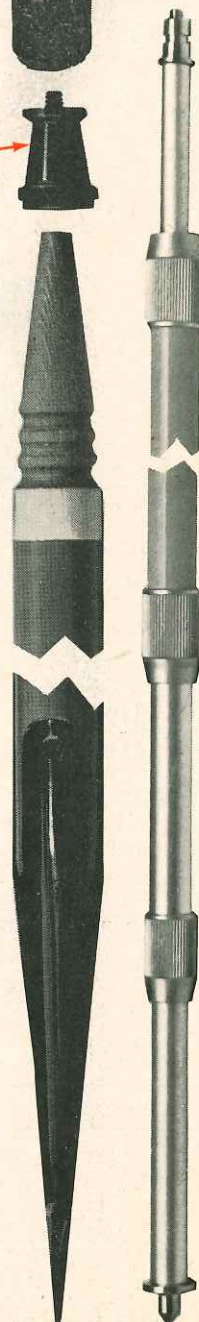
8026-28



Pocket Transit

Ball & Socket Head

Thimble



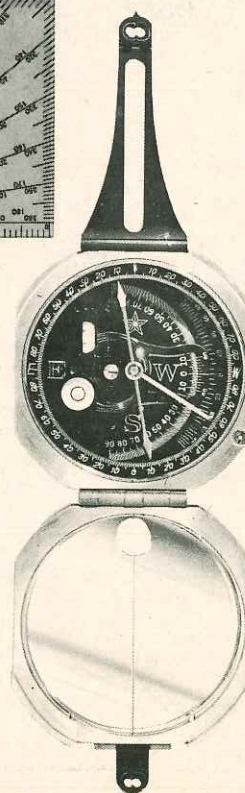
8022-54

8022-56

Jacob Staff

Brunton Pocket Transits

Stock No.	Mfr. No.	Description	Each
8026-00	F 2060	Brunton Pocket Transit graduated 0-360° without case	
8026-01	F 2061	Brunton Pocket Transit graduated 0-360° (damped) without case	
8026-05	F 2000	Brunton Pocket Transit graduated in quadrants—without case	
8026-06	F 2001	Brunton Pocket Transit graduated in quadrants (damped)—without case	
8026-10		Leather Case with belt strap for Brunton	
8026-11		Leather Case with sling strap for Brunton	
8026-12	F 3020D	Leather Case with sling strap for Brunton, Ball & Socket Head and Tripod	
8026-23		Ball & Socket Head only—without case	
8026-24	F 3050	Collapsible metal tripod; extends to 42 inches — without case	
8026-25		Jacob Staff thimble	



8026-05

COMPASS WITH TRANSITING TELESCOPE

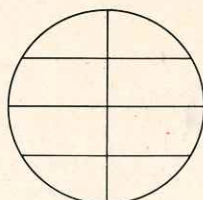
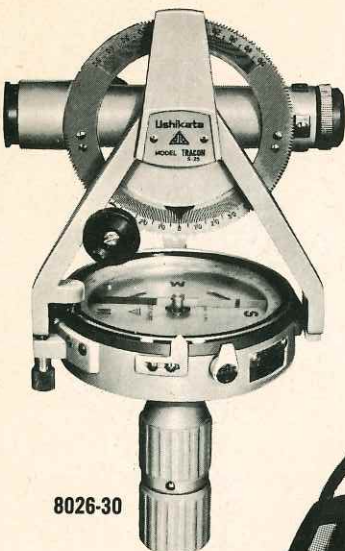
A lightweight compact surveying compass ideal for use where a small pocket transit is needed for general surveying. Especially designed for forestry and mountain surveys. Complete with a strong moulded carrying case with shoulder strap.

SPECIFICATIONS:

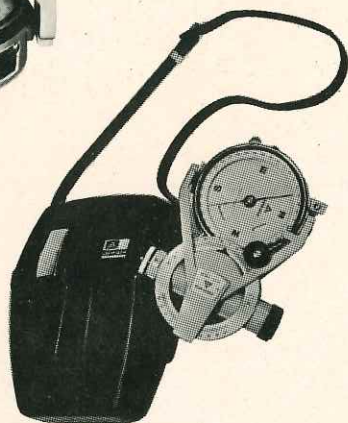
- Telescope:** 12 power, erect image—length 4¾"—minimum focus 4'—Type E reticle. Stadia ratio 1:100.
- Vertical Circle:** Graduated in degrees, 50° — 0° — 50° (Top and bottom).
- Horizontal Circle:** Graduated in degrees with vernier reading to 5 minutes. With unique lever-actuated zero setting device.
- Compass:** Graduated to degrees, in quadrants 0-90° with declination adjuster.
- Vernier Controls:** For horizontal and vertical motions.
- Weight:** Instrument in case—3½ lbs. approx.

Stock No. 8026-30 Mfr. No. S-25 Each,

For tripod see 8026-33 below.



Reticle supplied



8026-30

COMPASS WITH TELESCOPE

This is the same instrument as the No. 8026-30 described above. Specifications are identical except as follows:

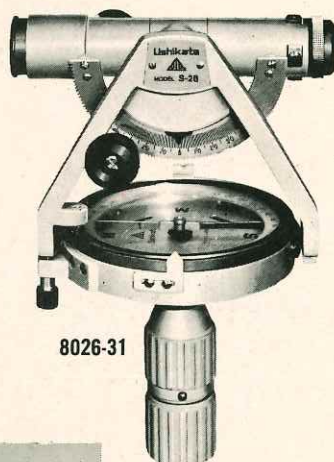
SPECIFICATIONS:

- Telescope:** Same as 8026-30 above.
- Vertical Limb:** A semi-circle, graduated in degrees 50° — 0° — 50°.
- Horizontal Circle:** None on this model.
- Compass:** Graduated to degrees, in quadrants 0-90° with declination adjuster (same as 8026-30 above).

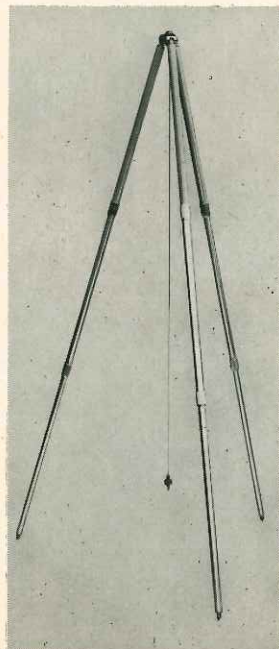
Stock No. 8026-31 Mfr. No. S-28 Each,

Stock No. 8026-32 All specifications identical to 8026-31 above except compass graduated to degrees numbered 0-360° . Each,

For tripod see 8026-33 below.



8026-31



TRIPOD

Suitable for use with above surveying compasses. Tubular aluminum ext. legs, 3 stages. Tripod head threaded for compass base, converts to ¼" x 20 thread for pocket transits, rangefinders & cameras. Protective cap is used as a plummet, in canvas carrying case with sling strap. Length 53" extended — 21" closed. Weight 2 lbs.

Stock No. 8026-33 Each,

Pocket Compasses



8022-00

LIEZ GEOLOGICAL AND FORESTRY COMPASS

Aluminum case $4\frac{1}{2}$ inches square with folding sights. Raised compass ring graduated to degrees with adjustment for setting off declination. Three-inch needle has jeweled center with stop. Beveled ring on compass box graduated to degrees and numbered in quadrants with sighting marks at each quadrant and knurled edge for revolving in azimuth. Pendulum clinometer graduated to degrees; 90 degrees in each direction. Edges of base graduated as protractor; inches and eighths; inches and tenths. Spirit level in box. With ball and socket joint and thimble in leather carrying case with shoulder strap.

Stock No. 8022-00 Each,

LIEZ SURVEYING COMPASS

Similar to No. 8022-00 but without square base, pendulum clinometer and revolving beveled ring on compass box. Complete with ball and socket joint and leather carrying case with shoulder strap.

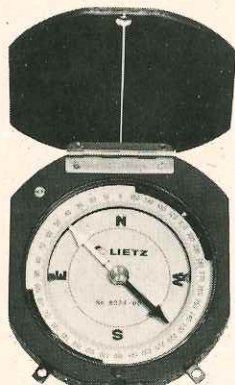
Stock No. 8022-50 Each,



8022-50

ACCESSORIES FOR COMPASSES

Stock No.	Description	
8022-01	Leather case with shoulder strap for 8022-00	Each,
8022-51	Leather case with shoulder strap for 8022-50	Each,
8022-53	Ball and socket with thimble for 8022-00 or 8022-50.	Each,
	See accessory listing under Lietz Pocket Transit for Jacob Staff and tripod.	



8024-00

LIEZ FORESTRY COMPASS

Light, strong, moisture-proof. Compass ring is so arranged that declination of needle can be set off. Hinged cover with sight line; 2-inch needle with jeweled center and automatic stop. Raised metal ring graduated 0-360°.

Stock No. 8024-00 Forestry Compass Each,
 Stock No. 8024-05 Same as No. 8024-00 but graduated in quadrants Each,

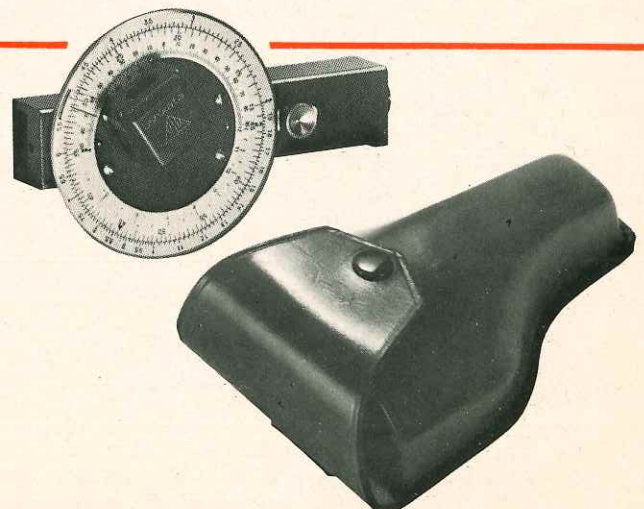
ALTI-LEVEL

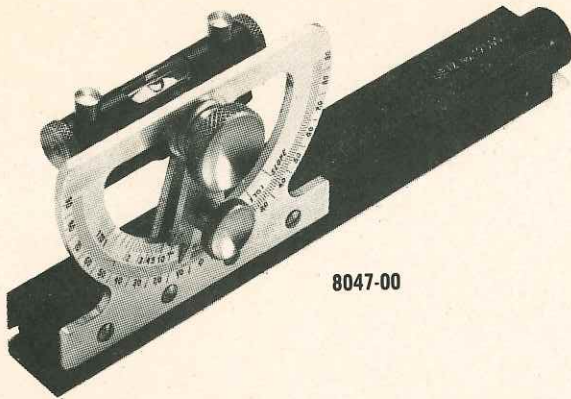
A unique device which consists of a hand level approximately 5 inches long with a 3.25 inch diameter circular scale attached. Can be used as a hand level, height finder, clinometer, distance measuring instrument or tangent slide rule.

The circular scale has logarithmic graduations on the outer edge to indicate distance or height. The inner scale has graduations 0 to 90° in both directions with a vernier reading to 10 minutes for measuring vertical angles and a logarithmic scale of the tangent of the indicated vertical angle.

This handy lightweight unit comes complete with belt loop, leather carrying case and instructions for use.

Stock No. 8047-60 Each,





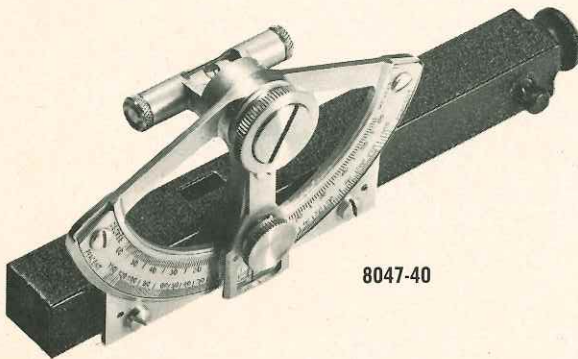
8047-00

ABNEY LEVEL

Abney hand level with clinometer level tube is $5\frac{1}{4}$ inches long. Pull-out eyepiece extends length to $6\frac{3}{4}$ inches, $1\frac{1}{4}$ -inch radius arc graduated to degrees — 0 to 90 in both directions with vernier reading to 10 minutes. Also has a slope scale 1:1 to 1:10 reading each way. In leather case with belt loop.

Stock No. 8047-00 Abney Hand Level Each,

Stock No. 8047-05 Same as No. 8047-00 but with arc graduated 0 to 90 in both directions and with a per cent scale from 0% to 100% Each,

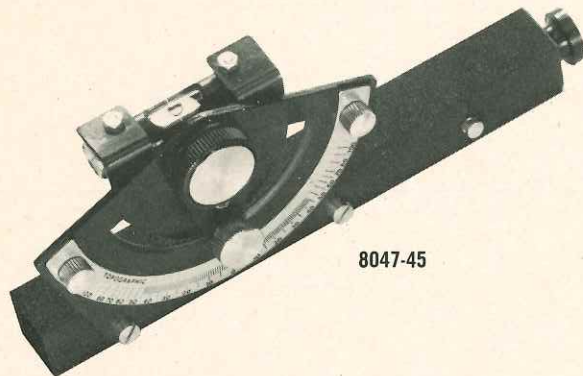


8047-40

TOPOGRAPHIC ABNEY LEVEL

This instrument has two interchangeable precision-graduated arcs with two-inch radius for determining percent of grade—degrees—topographic. The housing is recessed to receive both arcs securely. One arc is graduated in percent of grade on outer edge and the inner edge is graduated in degrees, 0 to 60 in both directions. The other arc is graduated in percent of grade on outer edge and the inner edge is graduated in topographic. Index has friction movement for fine adjustment. Brass level tube is approximately $6\frac{1}{2}$ inches long extending to $7\frac{1}{2}$ inches. The level has a non-glare finish and is furnished in sewed leather case with belt loop.

Stock No. 8047-40 Each,

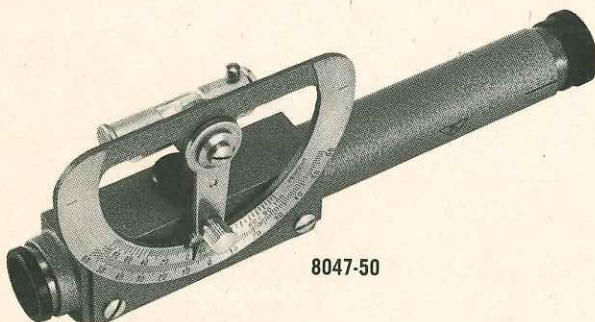


8047-45

TOPOGRAPHIC ABNEY LEVEL

Similar to No. 8047-40 above but less finely made. Equipped with two interchangeable arcs with 47 mm (1.85 inch) radius. One arc is graduated in degrees, 0 to 60 in both directions, the other arc is graduated in topographic. Index has friction movement for fine adjustment. Aluminum level tube is approximately $6\frac{3}{8}$ inches long extending to $7\frac{3}{8}$ inches. Non-glare finish. Pigskin case with belt loop furnished.

Stock No. 8047-45 Each,



8047-50

MAGNIFYING ABNEY LEVEL WITH STADIA

Five power magnification with 1:100 stadia with 7.3 inch (185 mm) barrel extending to 8 inches (203 mm). Has two-inch radius arc graduated to degrees — 0° to 60° in both directions vernier-reading to 10 minutes. Also has per cent scale (0% to 100%) in both directions.

Finger-tip, easy-slide focusing motions for both objective and eyepiece. Sturdy tubular construction with a 1-x 3-inch flat base providing facility to measure existing grades.

Durable, non-glare finish. Complete with stitched, box-type, velvet-lined heavy leather case with belt loop.

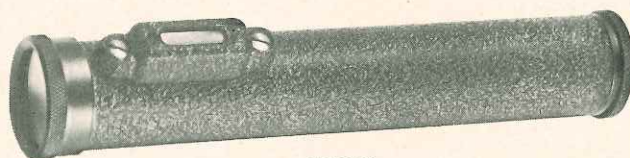
Stock No. 8047-50 Each,



Hand Levels



BULZ-I HAND LEVELS



8040-00

FEATURES:

- Each part can be easily replaced in the field — including bubble housing
- Draw-out eyepiece extends overall length for greater accuracy
- All exterior parts have painted or blued finish to eliminate sun reflection
- Bubble is reflected by first surface mirror for maximum illumination
- No springs used! Easily adjustable by positive, 2-screw motion
- Entire inner works mounted on removable slide for easy cleaning and maintenance. Adjustment of instrument not affected by removing slide.
- Leather case is both stitched and glued. Belt loop secured by rivets.

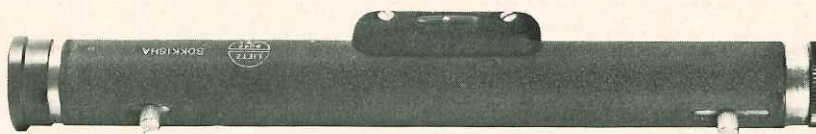
The choice of professionals!

These ruggedly constructed instruments have proven their ability to withstand the rigors of years of field use by thousands of engineers and surveyors. Specified by many state highway departments and other governmental agencies, the Bulz-I Hand Levels are unsurpassed in functional design and simplicity of construction.

Available in either 7- or 10-inch lengths; with or without stadia lines. Bulz-I Levels are made entirely of brass with durable finish. Supplied complete with belt-loop type leather case.

Stock No. 8040-00	5-inch length. Extends to 7 inches . . .	Each,
Stock No. 8040-05	As above but with stadia lines — ratio 1:20	Each,
Stock No. 8040-20	7-inch length. Extends to 10 inches . . .	Each,
Stock No. 8040-25	As above but with stadia lines — ratio 1:20	Each,

5X MAGNIFYING HAND LEVEL



This excellent instrument has 5-power magnification providing accuracy at far greater distances than possible with regular type hand levels.

The objective lens is mounted on a movable slide which brings distant objects into sharp focus. Eyepiece focusing

slide allows regulation of cross line image. 5x magnification of objective and 2x magnification of level bubble. Stadia lines with 1:100 ratio. Brass construction with durable finish. 7½-inch length; complete with belt loop leather case.

Stock No. 8042-60	Each,
-----------------------------	-------



Hand Levels

6³/₄-INCH HAND LEVEL



This level has the bubble located inside the tube for protection. The brass construction is similar to the Bulz-I's, with a removable slide containing the vial, reflector and half lens for easy cleaning and adjusting. Durable finish with a string stud on the underside to prevent rolling. 6³/₄ inch length. 1-inch diameter. Complete with belt loop leather case.

Stock No. 8043-00 Each,

6-INCH HAND LEVEL



This level has a fixed eyepiece, internally mounted bubble assembly and an adjustable reflector. A hexagonal objective cap prevents rolling. Durable finish. 6-inch length. With belt loop leather case.

Stock No. 8043-50 Each,

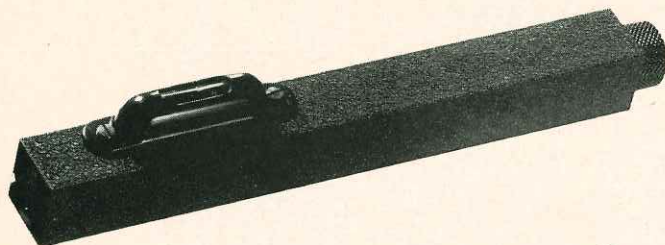
2X MAGNIFYING HAND LEVEL



This is similar to No. 8043-50 except with 2-power magnification. The 1-inch diameter tube is 6 inches in length extending to 7³/₄ inches. Complete with belt loop leather case.

Stock No. 8043-70 Each,

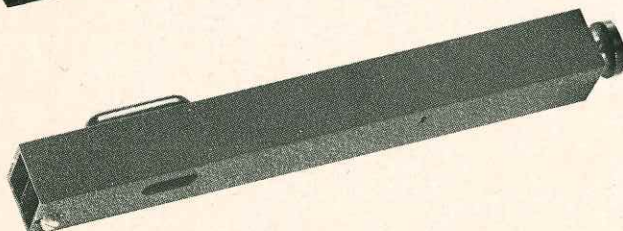
SQUARE TYPE HAND LEVEL



This can be used as a bench level. 5¹/₄-inch length with fixed eyepiece. Comes in a leather case with a belt loop.

Stock No. 8045-20 Each,

COMBO HAND LEVEL WITH RIGHT ANGLE PRISM



The square brass body is 6 inches long, with the bubble on top similar to 8045-20. The removable reflector unit permits right angle viewing when the aperture is rotated and the reflector unit is placed in an inverted position in the hand level tube. Versatile and easy to use. Comes with belt loop leather case.

Stock No. 8045-30 Each,

TRUE SIGHT HAND LEVEL



This level is made of high-impact phenolic plastic. Front element optic with a hardened steel crosshair.

Stock No. 8045-40 Each,



Accurate right angles . . . fast . . . easy

This highly useful instrument contains a double pentagonal prism which gives a precise right angle to the right and to the left while at the same time allowing the user to view straight ahead.

The two prisms have a wide field of view and are mounted with clear optical glass between to provide a view of the object ahead.

A protective metal cover rotates around the head to provide sighting windows when open and complete protection when closed. The handle is hollow so that it may be mounted on a staff and is slotted for attaching a plumb bob cord.

A leather case with belt loop is included.

Stock No. 8047-80 Each,

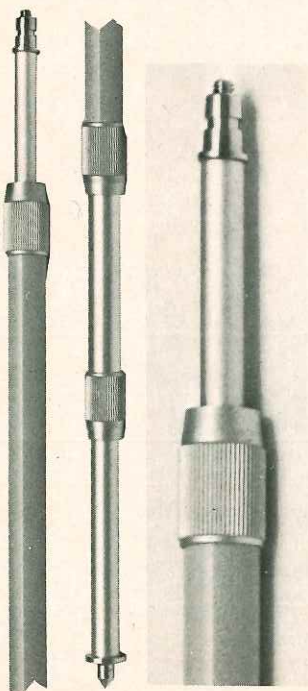
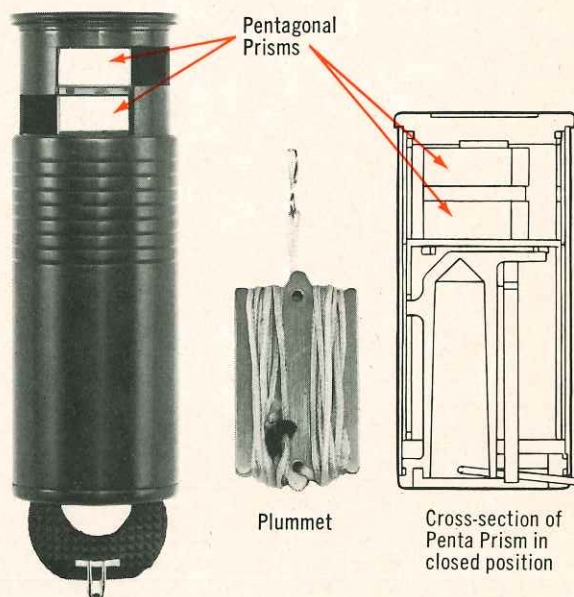
Deluxe model — completely self-contained

This instrument is a complete, self-contained accurate sighting system. Satin-finished, black-anodized, palm-grip barrel 1.4 inches in diameter by three inches long (collapsed) extends to four inches in length when used for sighting.

Housed within the barrel are two pentagonal prisms separated by a 3 mm optically flat foresight viewing glass. The upper pentaprism offers a view 90° to the right of your line of sight (foresight) while the lower pentaprism gives you a view 90° to the left of your foresight.

Contained within the barrel also is a one-ounce metal plummet with a five-foot braided nylon cord. Opening in base accepts No. 8022-56 telescoping Jacob Staff. Supplied with belt-looped leather case. Weight of instrument in case, four ounces.

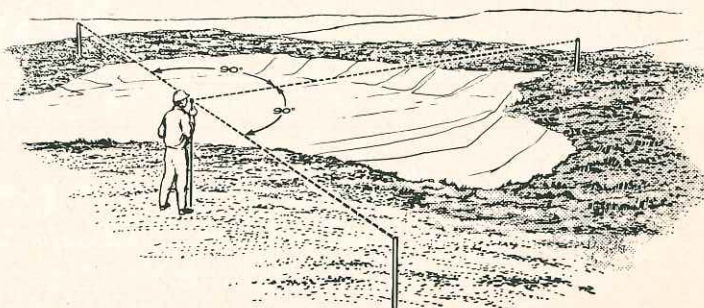
Stock No. 8047-85 Each,

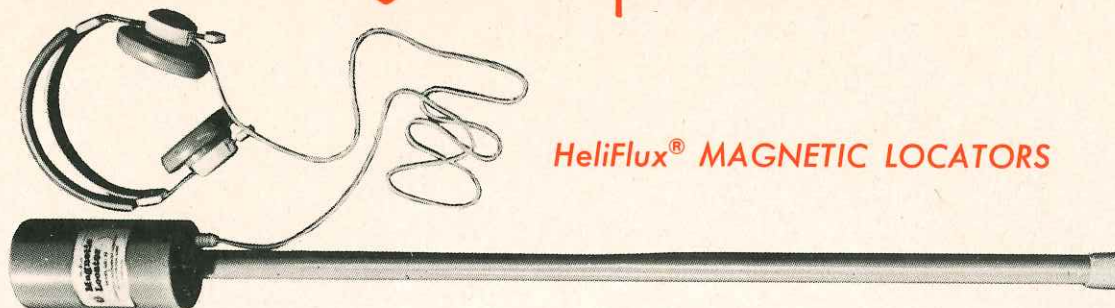


TELESCOPING JACOB STAFF

Constructed of tubular aluminum, this sturdy unit is adjustable in four steps from a collapsed length of 21 to 63¾ inches when fully extended. The bottom end is pointed while the upper end has a fixture which is tapered to fit into the base of No. 8047-85 Deluxe Penta Prism. Comes complete with a canvas carrying case which can be hooked to a belt. Weight — 10 ounces.

Stock No. 8022-56 Each,





HeliFlux® MAGNETIC LOCATORS

Schonstedt Magnetic Locators are considered by many surveyors to be indispensable in locating iron and steel objects, markers, monuments, P-K nails, etc. The locators are simple to operate, yet have outstanding range. You can search fast and in any direction. Objects can be found under snow, in shallow water, in dense brush and even under roads.

The HeliFlux locators will save you money, please your crew, and eliminate unnecessary excavation. They sense the magnetic field of ferromagnetic objects without responding to aluminum, brass, concrete, snow, soils or other nonmagnetic materials. When a locator comes in range of a target, a signal in the headphones guides the operator to the precise location.

There are two models to choose from, the GA-22 and the GA-32. In outward appearance, size, weight and method of operation, they are identical. Each operates on four C-cell batteries (1½ V each). Power is turned on when the headphone jack is plugged in.

The detection range is dependent on the state of magnetization of the marker. A ¾" diameter iron pipe, 18" long can be detected at a distance of 1½ to 2½ feet by the GA-22. The range of the GA-32 would be 1½ to 3 feet for the same pipe.

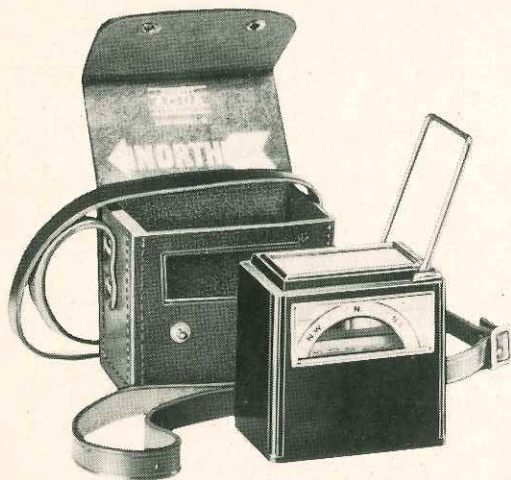
Ruggedly constructed, solid state electronics, operating temperature range 0°F to 120°F. Length 42 inches, approximate weight including headphones three lbs. The basic difference between these models is that the GA-32 is more sensitive and has a greater range. (One year warranty.)

Stock No. 8026-75	Mfr. No. GA-22	Each,
Stock No. 8026-80	Mfr. No. GA-32	Each,



Aqua Valve Box Locator

Locates valve boxes, surveyors stakes, septic tanks, sewer lids — in weeds, rocks, sand, snow or sleet.

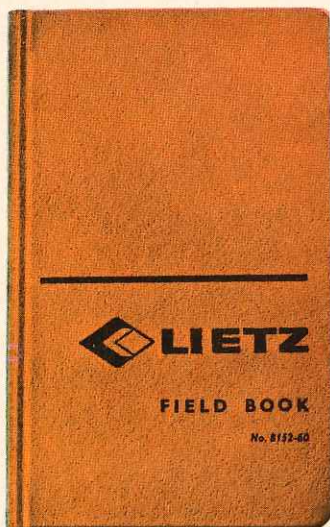


Instant top-view reading by mirror. Handle enables you to locate in difficult areas. Can be used as an accurate compass. Instrument uses a dipping needle magnetized to conform to magnetic inclination or dip degree for area in which it will be used. For maximum results, it is recommended that the instrument be used within a 75 mile radius of the area for which it is set. Instrument will detect ½" steel rod or 1" to 2" diameter iron pipe to depths of approximately 24", depending on the mass of the pipe and the density of the ground in which it is buried. Also very helpful in locating which area in an excavation to concentrate digging efforts. Nothing to break down — no batteries, wires or switches. Convenient shoulder strap eliminates bending or stooping to read. *Factory-adjusted for area of use which must be specified when ordering. Shipment made direct from factory only.*

Stock No. 8026-70	Each,
-----------------------------	-------

Easy-to-read face with every numeral sharp and bold. Dial is "eye-positioned" to read easily as you walk upright.





HIGH VISIBILITY CHROME YELLOW COVERS

Constructed to withstand the most rugged handling under all climatic conditions.

Lines on opposite pages are in register and are printed with weatherproof blue and red inks.

Each book contains 80 pages and the following tables:

- Formulae for solving right angles
- Curve formulae
- Minutes in decimals of a degree
- Inches in decimals of a foot

TRANSIT AND STUDENTS' FIELD BOOKS

Left page: blue horizontal lines; red vertical lines.
Right page: 8 vertical and 4 horizontal blue lines; red vertical center line. Size: $4\frac{1}{2} \times 7\frac{1}{4}$ inches.

Stock No. 8152-00 Transit Field Book Each,

Stock No. 8152-05 Students Field Book
Heavy paper cover; spiral bound; 36 pages Each,

MINING TRANSIT BOOK

Left page: blue horizontal lines; red vertical lines.
Right page: 8 x 8 blue lines; red vertical center line.

Stock No. 8152-20 Mining Transit Book
Size: $4\frac{1}{2} \times 7\frac{1}{4}$ inches Each,

ENGINEERS FIELD BOOK

Left page: blue horizontal lines; red vertical lines.
Right page: 10 x 10 blue lines; red vertical center line. Inch lines heavy.

Stock No. 8152-30 Engineers Field Book
Size: $4\frac{1}{2} \times 7\frac{1}{4}$ inches Each,

LEVEL BOOK

Both pages: blue horizontal lines; red vertical lines. 6 vertical columns.

Stock No. 8152-50 Level Book; $4 \times 6\frac{1}{2}$ inches Each,

Stock No. 8152-55 Level Book; $4\frac{1}{2} \times 7\frac{1}{4}$ inches Each,

FIELD BOOK

Left page: blue horizontal lines; red vertical lines.
Right page: 4 x 4 blue lines; red vertical center line.

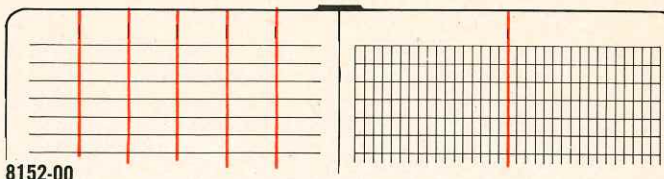
Stock No. 8152-60 Field Book Size $4\frac{1}{2} \times 7\frac{1}{4}$ inches Each,

CROSS SECTION BOOK

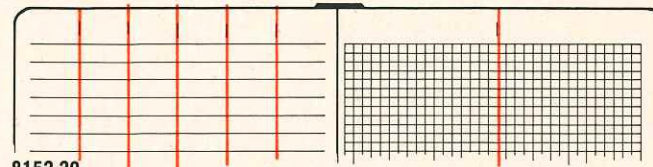
Both pages: 10 x 10 blue lines; inch lines slightly heavier.

Stock No. 8152-70 Cross Section Book, $5\frac{1}{2} \times 7\frac{1}{2}$ inches Each,

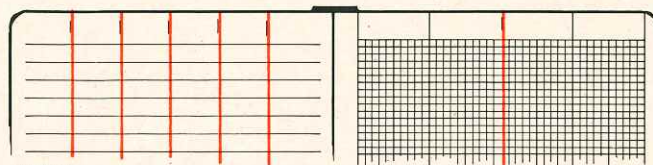
Stock No. 8152-75 Cross Section Book, $6\frac{1}{2} \times 8\frac{1}{2}$ inches Each,



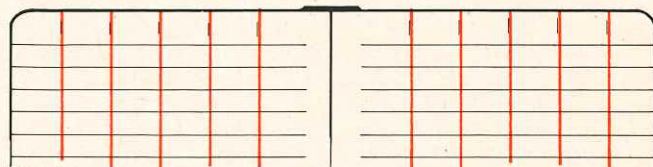
8152-00



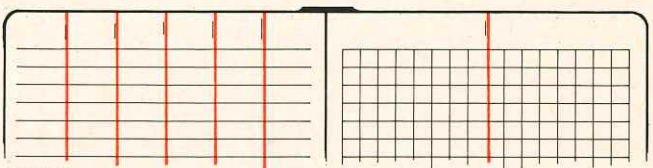
8152-20



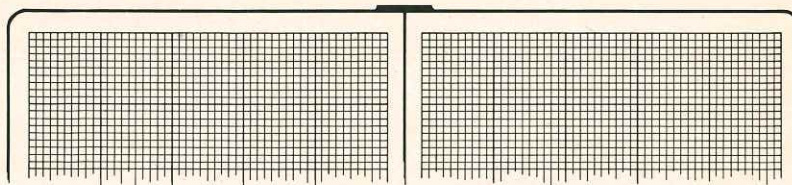
8152-30



8152-50



8152-60



8152-70

The paper in these books is a fine quality thick bond specially treated during the making to give "high wet strength". This quality has been used extensively for maps, etc. It retains its strength and writing surface when dried after having been subjected to extreme weather conditions.

RITE-IN-THE-RAIN WEATHERPROOF FIELD BOOKS

Made with an amazing paper created especially for writing field

notes in wet weather. It's actually possible to write clear, readable

notes during the heaviest down-pour.

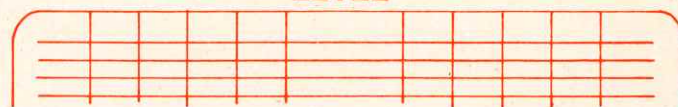
TRANSIT



Stock No. 8154-00 Mfrs. No. 300 Sixty leaves ruled 8 vertical lines to the inch. Page size, $4\frac{5}{8} \times 7"$. Bound in vivid yellow Fabricoid cover Each,

Stock No. 8154-10 Mfrs. No. 302 Same as above, except 100 loose leaf sheet pack* Pack,

LEVEL

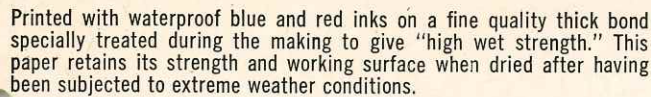


Stock No. 8154-05 Mfrs. No. 310 Sixty leaves ruled with 6 vertical columns each page. Page size, $4\frac{5}{8} \times 7"$. Bound in vivid yellow Fabricoid cover. Each,

Stock No. 8154-15 Mfrs. No. 312 Same as above, except 100 loose leaf sheet pack* Pack,

*Standard 6-hole punching: $\frac{3}{4}"$, $\frac{3}{4}"$, $2" \frac{3}{4}"$, $\frac{3}{4}"$ Sheet size $4\frac{5}{8} \times 7"$.

Entire line of Rite-In-The-Rain Field Books available through Lietz.



Available in two styles:

Double sheets are ruled on one side only and the left and right hand pages of each record are joined — banded 50 doubles.

Yellow Buckram covered stiff board construction; lined with black paper; 50-page capacity. Sturdy sheet lifter. Size 5 $\frac{3}{8}$ " x 7 $\frac{3}{4}$ ". 1 $\frac{1}{2}$ " Ring

As above but 100 page capacity. Size 55/8" x 73/4". 1" Ring

Stock No. 8153-75 Each,

Yellow Polyethylene 55-gauge, one-piece cover. Resists dirt, grease and mud and withstands heat, cold, snow, etc. Durable one-piece hinges. Size 5¼" x 7¾". ½" Ring

NAIL MARKERS

One-inch squares made of plastic impregnated nylon. You can't rip or tear them. Fluorescent orange color makes spotting stake tacks or P.K. nails quick and easy. 70 in package.

Stock No. 8115-01 With 1/4" hole Package,
Stock No. 8115-02 With 1/8" hole Package,

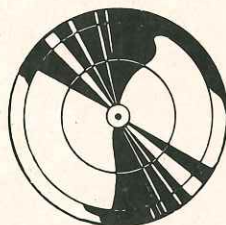


8115-01

SURVEYORS' FLAT SHINERS

Tins 2 1/4 inches in diameter with center punch and crimped edges. Especially valuable for indicating semi-permanent points with spikes or nails.

Stock No. 8134-30 3 pound carton,
(approx. 250 count)



8134-30

SURVEYORS' RAISED SHINERS

Same as above except 1 5/16 inches in diameter with raised, 1 1/8-inch center. (Not illustrated.)

Stock No. 8134-31 Per Pound,
(approx. 260 per lb.)

LEAD WIRE

Diameter, 3/8"; 18" long. For lead and tack reference points. Fits hole cut by No. 8130-88 concrete drill.

Stock No. 8132-20 Per Length,

SURVEYORS' TAGS

Small Survey Tag. Imprinted with L.S., P.E., R.E., or R.C.E. plus up to a 5 digit number (example: L.S. 12345).

Stock No. 8134-40 Per Hundred,

Large Survey Tags. Imprinted with L.S., R.C.E., P.E. plus up to a 6 digit number (example: R.C.E. 234567).

1 1/4" O.D. 22 gauge (.025") Brass with 7/64" Dia. center hole. For use with 8132-30 Brass Nail.

Stock No. 8134-45 Per Hundred,

1 1/4" O.D. 18 gauge (.040") Brass with 3/8" Dia. center hole. For use with our 8132-58 or 8132-60 marking spike or a 60 penny nail.

Stock No. 8134-46 Per Hundred,

1 1/4" O.D. 18 gauge (.040") Brass with 1/4" Dia. center hole. For use with our 8132-62 or 8132-64 monument spikes.

Stock No. 8134-48 Per Hundred,

1 1/2" O.D. 14 ga. (.065") 2024 Aluminum with 1/32" Dia. center hole for use with our 8132-58 or 8132-60 marking spikes or a 60 penny nail

Stock No. 8134-50 Per Hundred,

8134-40

8134-45

8134-46

8134-48

8134-50

MONUMENT SPIKES

Large monument spike, 3/8" square shank, galvanized with chisel point and button head. Makes ideal bench mark or turning point.

Stock No. 8132-62 6" long Each,

Stock No. 8132-64 8" long Each,



8132-70

STAKE TACKS

Steel—3/4" long—bright finish—with indentation in head to guide plumb bob point. One pound package. (Approximately 725 per lb.)

Stock No. 8132-70 Per Pound,

CONCRETE NAILS

Made of heat-treated and tempered steel so it will not bend when driven in concrete or hard pavement. Available with flat or oval head, in 1 pound, 5 pound or 50 pound packages.



8132-75



8132-85

FLAT HEAD

		Approx. Count	
Stock No. 8132-75	1" x 3/4"	200	. . . Per Pound,
Stock No. 8132-80	1 1/2" x 3/4"	150	. . . Per Pound,

OVAL HEAD

Elevated head (one high spot) aids in relocation and for use in establishing accurate elevations.

Stock No. 8132-85 1" x 3/4" 200 . . . Per Pound,

MASONRY NAILS

Parker-Kalon ("P-K") hardened masonry nails. Cadmium-plated to resist rust and increase visibility. Packaged in boxes of 100 nails.



8132-51

Stock No.	Size	Box
8132-51	3/4" x 1/8"	
8132-52	1" x 5/32"	
8132-53	1 1/4" x 3/16"	
8132-54	1 1/2" x 1/4"	
8132-55	2" x 1/4"	
8132-56	2 1/2" x 1/4"	

BRASS NAILS

5/8 inches long with round head. Ideal for reference or permanent lead and tack points. The head provides sufficient elevation to make relocation easy. One pound package.

Stock No. 8132-30 Per Pound,

MARKING SPIKES

Hardened steel, 2-inch spike, bright finish with 7/16" diam. flat head and 7/32" square shank. Especially useful for stationing and setting semi-permanent points in asphalt concrete and other materials that will not accept ordinary spikes, nails, pins, hubs, etc. When monuments are punch marked for accurate measurements, the square shank prevents rotation and thereby eliminates eccentric misalignment. Approx. 44 per lb.

Stock No. 8132-58 Per Pound,

Stock No. 8132-60 Same as above except 1/2" diam. flat head and 1/4" square shank — approx. 30 per lb. Per Pound,



8132-60

SURVEY MARKERS

Lietz survey monument markers are die cast from solid brass. The square ribbed shank prevents turning or loosening once they are set in concrete. The 1/8-inch-thick top has a non-glare matte finish.

Stock No.	Top Diam.	Shank Area	Shank Length	Each
8134-00	1 3/8 in.	0.4 in. sq.	2 in.	
8134-03	2 in.		2 in.	
8134-06	2 1/2 in.		2 in.	
8134-08	3 in.		2 in.	

8134 Series markers can be furnished with linear or circular letters, numerals or characters on special order. Write us for quotation.

CURVED HEAD SURVEY MARKERS

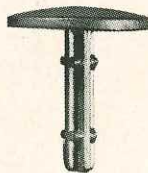
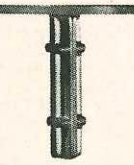
Solid brass markers with curved heads. The square ribbed shank prevents turning or loosening once they are set in concrete.

Stock No.	Top Diam.	Shank Area	Shank Length	Each
8134-10	1 3/8 in.	0.4 in. sq.	2 in.	
8134-13	2 in.		2 in.	
8134-16	2 1/2 in.		2 in.	
8134-18	3 in.		2 in.	

SPRAY PAINT

Aerosol spray cans are handy for many field uses. Available in white, red and fluorescent red-range. Fluorescent color should be under sprayed with white to be most effective. 13 oz. can (12 cans packed in carton).

Stock No. 8134-74	Red-Orange Fluorescent	Each,
Stock No. 8134-76	Glossy White	Each,
Stock No. 8134-78	Banner Red	Each,



8268-90



8134-60



8134-68



8134-71



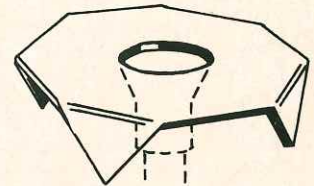
8134-80

COPPERWELD SURVEY MARKERS

The Copperweld molten-welding process unites the steel core with thick copper covering in a permanent weld. Thus they have the strength and rigidity of steel with the positive rust resistance of copper. Shanks have 5/8-inch diameter; bronze heads have 1 1/2-inch diameters with permanent compression fit. Copperweld survey markers provide excellent visibility and are strong and easy to drive. The extra-large bronze head is ideal for center-punching the exact point of reference with additional space for stamping identifying legend. Markers respond to dip needles. (Standard pack 10 per carton.)

Stock No.	Length	Each
8134-80	18 in.	
8134-81	24 in.	
8134-82	30 in.	
8134-83	36 in.	

ADAPTER FOR COPPERWELD SURVEY MARKERS



Provides extra-large, 4-inch bronze surface for stamping identification. Fits flush with the marker and four triangular points prevent turning. Ideal for monument markers, intersections, rights of way, cemeteries, public works and other projects.

Stock No. 8134-88	Each,
-------------------	-------

TIMBER SCRIBER

Has hardened steel cutters mounted on pointed machine steel. Wood handle. Overall length 7 1/2 inches.

Stock No. 8268-90	Each,
-------------------	-------

LUMBER CRAYONS AND HOLDER

For marking steel, concrete, stone, lumber—almost any surface with vivid, long-lasting colors. Lumber crayons are 4 1/2 inches long, 1/2-inch diameter; hexagon, paper-covered. Packed one dozen in box; 6 boxes to carton. Specify color: 494 carbon black, 496 yellow, 520 red, 521 blue.

Stock No. 8134-60	Per Doz.,
-------------------	-----------

Crayon holder is hardwood with duralumin thread to prevent slipping. Protects hands and saves crayons; 4 7/8 inches over-all. Packed 1 dozen in box.

Stock No. 8134-68	Each,
-------------------	-------

BLACK FELT-TIP MARKER

Press-on, tight-seal, no-roll cap prevents evaporation and makes marker last longer. Cap stores on base when not in use. Bullet-shaped body of aluminum is leakproof and gives 30% more volume. Chisel point is ideal for marking on wood, metal, glass, plastic or paper. Supplied with pocket clip. Packed one dozen in box.

Stock No. 8134-71	Box of 12,
-------------------	------------



Surveyors' Accessories

LIETZ PLUMB BOBS

These highest-quality plumb bobs are machined from solid brass rod for perfect balance and are beautifully finished. Screw caps and hardened steel points provided with standard threads. Made to U. S. Government specifications.

Stock No.	Description	Each
8122-10	10 oz.	
8122-12	12 oz.	
8122-14	14 oz.	
8122-16	16 oz.	
8122-18	18 oz.	
8122-24	24 oz.	
8122-32	32 oz.	
8122-90	Extra Points	
8122-91	Extra Caps	

LEATHER SCABBARDS

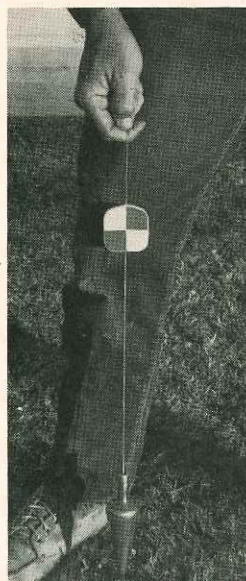
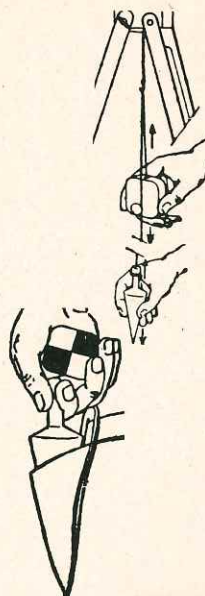
Extra heavy with stitched and riveted pocket. Strap for holding plumb bob. Slots in back for attaching scabbard to belt.

Stock No.	Description	Each
8123-10	For bobs 10 to 12 ounces	
8123-20	For bobs 14 to 16 ounces	
8123-30	For bobs 18 to 24 ounces	
8123-40	For 32 ounce bob	

PLUMB BOB CORD

Finest quality braided cord on 25 yard blocks.

Stock No.	Description	Each
8124-10	White, heavy wt. linen	
8124-13	White, medium wt. linen	
8124-23	Orange, medium wt. linen	
8124-36	Fluorescent Red, medium wt. nylon, 24 yd. spool	



GAMMON SURVEYOR'S REEL

Drop-plumb bob to desired position and stop with finger pressure in usual way. Take two turns on small boss and target hangs with plumb bob true over the point. No more winding, broken or muddy string. When released, "swish" and it's back at the plumb bob. Weighs only 1½ oz. Equipped with 7 ft. of 72 lb. test orange nylon string.

Stock No. 8124-50	Each,
Stock No. 8124-51	24 yd. Each, bobbin of orange nylon string for above

LEATHER SCABBARD FOR GAMMON REEL OR POCKET TAPE AND PLUMB BOB

Rugged leather with stitched and riveted pockets each having snap fastener. Slots are provided for attaching scabbard to belt.

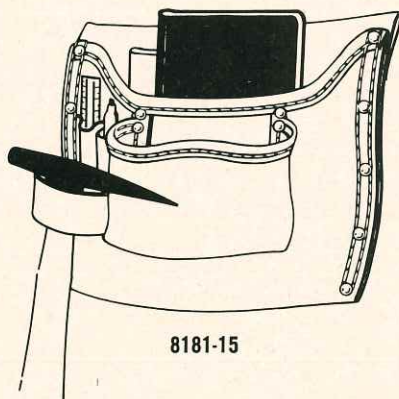
Stock No. 8123-65	Holds reel or tape and 16-18 oz. plumb bob . . . Each,
-------------------	---

LEATHER TOOL POUCH

Leather construction with 9" x 9" pouch for carrying field books, etc. Also equipped with a second attached pouch 6" x 4" for carrying spikes, nails, etc. Storage slots are provided for carrying lumber crayons, felt markers, slide rule or other tool. A leather loop is useful for carrying either a hammer, hand axe, prospecting pick or steel tape. A 12 foot Lufkin rule may also be clipped over the leather loop.

The pouch has a wide belt loop for riding high on the left hip so items won't bounce while walking. An ideal accessory item for surveyors, construction engineers, geologists, etc.

Stock No. 8181-15	Each,
-------------------	-------



8181-15

PLUMB BOB TARGETS

Plastic. Rectangular shape measuring 2 x 4 inches. Red and white quadrants. Notched for attaching to line.

Stock No. 8126-20	Each,
-------------------	-------

Paper. Rectangular shape measuring 2 x 3½ inches. Red and white quadrants. (Not illustrated)

Stock No. 8126-30	Per Hundred,
-------------------	--------------

Translucent Plastic. Rectangular shape measuring 2½ x 4 inches. Laminated plastic with special see-through target design for brilliant illumination. Notched for attaching to line.

Stock No. 8126-25	Each,
-------------------	-------

Metal. Oval-shape metal target, notched for attaching to plumb bob line. Red and white quadrants.

Stock No. 8126-10	Each,
-------------------	-------



CUTTER FIRST AID KIT

Contains 35 essential first aids for quick, on-the-spot emergency help. Compact, unbreakable case keeps out dirt and moisture and is contoured to fit pocket or pack. Unique closure prevents accidental opening.

Stock No. 8130-90 Each,



CUTTER SNAKE BITE KIT

Most effective, easiest-to-carry-and-use kit made. Small, self-contained unit has 3 soft-mouthed suction cups plus all essential first aid features.

Stock No. 8130-93 Each,



SURVEYORS' UMBRELLA

Protects engineer and instrument from sun. Cuts glare appreciably thereby providing more accuracy in taking readings. Made of red heavy drill fabric with approximately 63-inch spread. Umbrella has six ribbed panels. Complete with 8-foot, 2-section pole painted with a baked aluminum enamel which resists rust.

Stock No. 8136-40 Each,



8136-40

ENGINEERS' FIELD BAGS CANVAS

Canvas bag for surveyors with two compartments and adjustable shoulder strap. Size 9 x 7 x 2 inches. (Not illustrated.)

Stock No. 8181-20 Each,

EMERGENCY SAFETY FIRST AID KIT

Complete 24 unit first aid kit suitable for use on construction jobs and field survey use. Ideal for inclusion in construction vehicles. Meets most federal and state standards. Packed in waterproof steel case 9½ x 9½ inches square. Fold down mounting bracket for wall hanging, handle for carrying.

Stock No. 8130-95 Each,



STAKE BAG

Heavy-duty orange canvas with adjustable, 1½-inch web shoulder strap. Size 16 x 12 x 6 inches with three pockets 8 inches deep across the front. Pockets across each end measure 6 x 7 inches.

Stock No. 8181-35 Each,

Same as above but white canvas.

Stock No. 8181-30 Each,

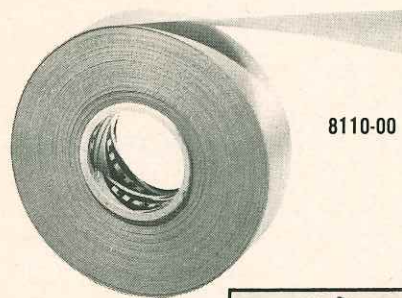


8181-35

PLASTIC FLAGGING TAPE

Brilliant, highly-visible tape that is colorfast, rainproof and non-toxic. Available in red, orange, blue, yellow and white. 300 foot rolls are 1¼ inches wide. Packed 1 doz. to a box.

Stock No. 8110-00 1¼" x 300 feet Each,



8110-00

8-INCH PLASTIC FLAGGING TAPE

Available in the same colors as above plus black. 300-ft. rolls are 8 ins. wide.

Stock No. 8111-00 8" x 300 feet Each,

FLUORESCENT PLASTIC FLAGGING TAPE

Available in red, orange, yellow or pink extra-high-visibility fluorescent color. 150 foot rolls are 1¼ inches wide. Packed 1 doz. to a box.

Stock No. 8112-00 1¼" x 150 feet Each,

FLAGGING DISPENSER

The convenient, economical and practical way to cut flagging tape strips of any length — right off the roll. Fast and trouble-free. Lightweight, rustproof; fits on belt or waistband. No moving parts.

Stock No. 8110-10 Each,



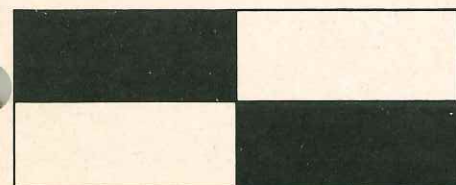
8110-10

QUIK-STIK TARGETS

A real timesaver. Just peel off the paper backing and Quik-Stik can be applied to any surface. Target has red and white quadrants; color stays bright for weeks in direct sunlight. Available in two sizes. Large size fits exactly around any one quart motor oil can making a handy, inexpensive survey sight.

Stock No. 8126-40 Size: 2 x 3½ inches Pkg. of 25 Each,

Stock No. 8126-45 Size: 5¼ x 12½ inches Pkg. of 10 Each,



8126-45



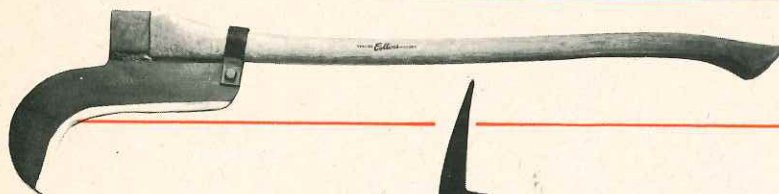
8126-40



MACHETE

For cutting brush and scrub. Will take razor-sharp edge. Plastic handle; 22-in. polished steel blade.

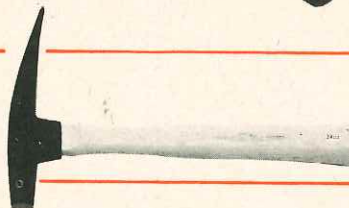
Stock No. 8130-00 Each,
Stock No. 8130-01 Leather Sheath with belt loop Each,



BUSH HOOK

Three-pound, 11-inch red painted steel blade with 36-inch hickory axe handle.

Stock No. 8130-10 Each,



PROSPECTING PICK

Square corners, sharp edges and point on 1½ pound head; 12-inch hickory handle.

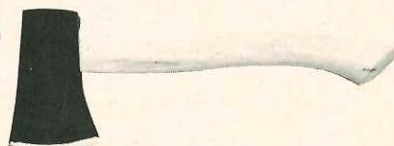
Stock No. 8130-20 Each,



PICK HAMMER

Square corners, sharp edges and point. 13-inch steel handle with molded grip cannot loosen, break or splinter. Weight 22 ounces.

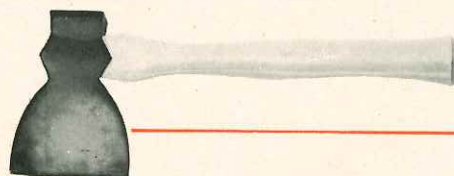
Stock No. 8130-22 Each,



HAND AXE

Carbon-finish head; 14-inch hickory handle. 1½ lbs.

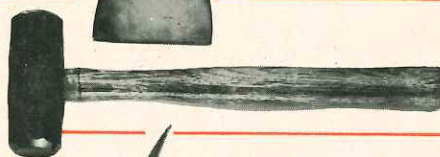
Stock No. 8130-40 Each,
Stock No. 8130-41 Leather Sheath with snapflap and slots for attaching to belt Each,



BROAD HATCHET

Single bevel, velvet black tool-steel head with 4½-inch cut; 16-inch hickory handle. Weight 3 lbs.

Stock No. 8130-45 Each,



SINGLE JACK SLEDGE

Quality steel head with double face (not tapered). Sixteen-inch hickory handle; weight 4 pounds.

Stock No. 8130-60 Each,



STRAIGHT CLAW HAMMER

A useful tool for any survey crew. All steel construction with molded grip. Weight 16 ounces.

Stock No. 8130-65 Each,

GAD



Rectangular, tempered tool steel, ¾ x 1¾ x 18 inches. Excellent for breaking pavement and making pilot holes for stakes in hard ground.

Stock No. 8130-80 Each,

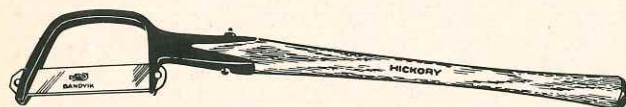
CONCRETE DRILL



Heat-treated, tempered carbon steel 7½ x 5⁄8 inches. Heavy handle eliminates sting; fast-cutting "V" edge. Drills proper hole for 3⁄8 in. round lead wire.

Stock No. 8130-88 Each,

SANDVIK BUSH AXE



Inexpensive, replaceable blade quickly slices through 3" or 4" brush and saplings. Safer to use than machete. 28" hickory handle; 7¼" Swedish steel blade.

Stock No. 8130-15 Each,

Replacement handle for above.

Stock No. 8130-16 Each,

Replacement blade for above.

Stock No. 8130-17 Each,

HAND AXE



Forged, fully-ground, 1¼ pound head permanently bonded to 15-inch shaped birch handle. Furnished with rugged plastic head sheath with handle for carrying or hanging and slots for carrying on belt.

Stock No. 8130-35 Hand Axe with Sheath Each,
Stock No. 8130-36 Sheath only Each,

Safety Equipment

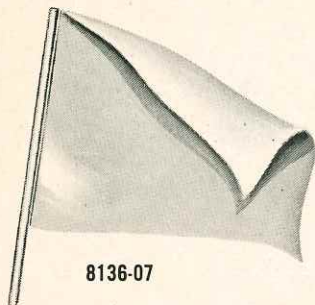


8136-00

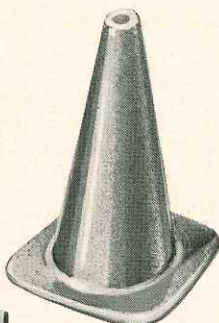


8136-05

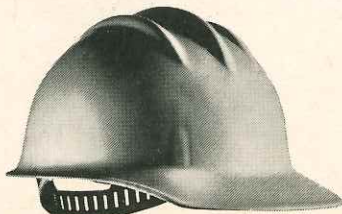
8136-10



8136-07



8136-18



HIGH LEVEL WARNING SCOPE

Uniquely designed to be the finest portable telescoping stand for traffic safety use. Quality through choice of materials and refinements assure the ultimate in functional design. Drawn aluminum tubing, die cast aluminum and zinc parts, extruded plastics, die cast plastics, stamped and machined parts, nylon and vinyl, baked enamels, chrome and zinc plating, all together result in a quality warning device. Four legs for unequaled stability. Three 18 x 18 inch fluorescent red vinyl coated flags with stiffeners.

The warning sign is 24 x 24 inches and made of vinyl coated fabric. Federal orange in color, it rolls up for easy storage and has metal bracing when unfolded. Legend reads "Survey Party Ahead". Complete unit extends to an overall height of approximately 9 feet 2 inches and consists of the warning scope assembly, flag yoke with three flags and three flag staffs, roll up sign and one 12 lb. leg weight.

Stock No. 8136-00 Each,

FOLD-AWAY WARNING SIGN

Designed to withstand high winds, this device stands almost five feet high at the flag tips. It opens and closes automatically; and when folded up, it occupies so little space it will fit under a car seat. Will accept two 18x18 signs so legend may be read from two directions. Signs are diamond shaped, made of zinc-coated bonderized steel with federal orange baked enamel finish. Legend reads "Survey Party". Complete with two 18 x 18 inch fluorescent red plastic flags and 1 18 x 18 inch sign. Second sign must be ordered separately if desired. 24 x 24 inch signs available on special order at extra cost.

Stock No. 8136-05 Each,
Stock No. 8136-08 Extra 18 x 18 inch sign Each,

Replacement parts for Safety Signs are available on special order.

SWING TYPE WARNING SIGN

Sturdy frame of structural angle iron 1 x 1 x 1/8 inch equipped with two "S" hooks for hanging sign within frame. Two flag holders welded to frame top. 24 x 24 inch sign finished in federal orange baked enamel, single faced legend reads "Survey Party". Equipped with two 18 x 18 inch fluorescent red plastic flags on 24 inch long wood handles. Sign folds flat for easy storage.

Stock No. 8136-10 Each,

HAND WARNING FLAG

18" x 18" fluorescent red vinyl flag supplied with 24" wood handle. For use in traffic control. Larger sizes available on special order.

Stock No. 8136-07 Each,

TRAFFIC CONES

Long life, high-intensity fluorescent red-orange cones. Weighted base gives good stability. Polyvinyl chloride has high strength and durability. Serviceable at temperatures from 150° to -20° F. Far outlasts most traffic cones presently available. (Packed 25 each per carton.)

Stock No. 8136-12 12 inch size Each,
Stock No. 8136-18 18 inch size Each,

SAFETY VEST

Bright red-orange color provides striking visibility over long distances. Can be worn over regular coat or jacket. Has 12 convenient compartments. Durable, washable 8-ounce pre-shrunk 50% Dacron® polyester/50% cotton.

Stock No.	Description	Each
8136-20	Small (32-36)	
8136-22	Medium (38-40)	
8136-24	Large (42-44)	
8136-26	Extra Large	

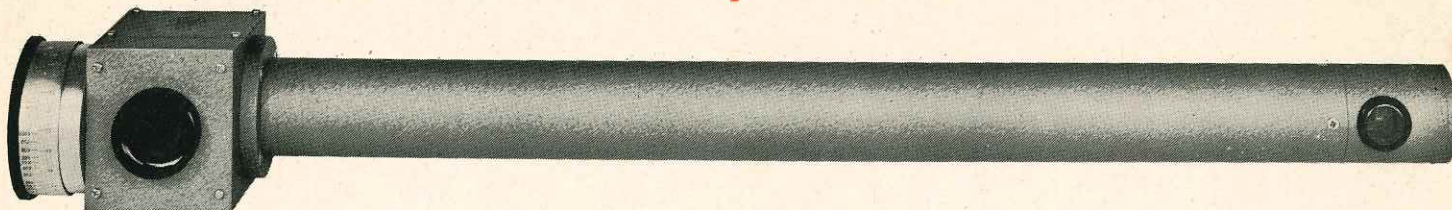
SAFETY CAP

Three-rib design shell of high-density polymer provides excellent protection against severe impact and falling objects. Also provides maximum protection against corrosive materials. Molded in one piece without holes, rivets or metal fittings. Special design neck strap makes chin strap unnecessary for most uses. Complies with all applicable specifications: ANSI Z89.1-1969 (Class A)—Federal Spec. GGG-H-142g. High visibility orange. Fits sizes 6 3/8 through 8. Weight 11 oz.

Stock No. 8136-30	Surveyors Safety Cap	Each,
Stock No. 8136-33	Replacement Suspension for above	Each,
Stock No. 8136-34	Winter Liner (Hood Type) for above	Each,



Lens-Displacing Type Range Finders

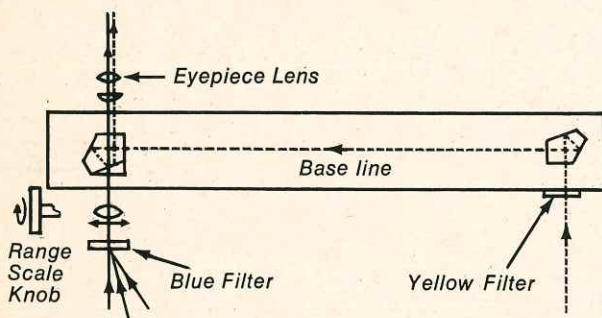


These highly-accurate Lietz Rangefinders are of the lens-displacing type. Conventional rangefinders utilize rotation or parallel displacement of prism or mirror and are therefore more susceptible to temperature variations and to shock. The Lietz lens displacement system virtually eliminates these problems and assures that precise operational accuracy will be maintained despite hard use over many years.

Stock No. 8026-15	Mfr. No. SD-5F	500 mm (19.7") base line reading to feet	. Each,
Stock No. 8026-16	Mfr. No. SD-5M	500 mm (19.7") base line reading to meters	. Each,
Stock No. 8026-18	Mfr. No. SD-3F	300 mm (11.8") base line reading to feet	. Each,
Stock No. 8026-19	Mfr. No. SD-3M	300 mm (11.8") base line reading to meters	. Each,

FEATURES

- Lens displacement system means greater accuracy — longer life
- Use of pentagonal prism and annular support prevents vertical parallax and maintains accuracy even under extremes of heat and vibration
- The telescope provides a bright, wide viewing field with high magnification
- Complementary colors of yellow and blue used in viewing field facilitate accurate measurement
- Lightweight — Threaded base for easily mounting on camera tripod. (Refer to Stock No. 8026-33 listed under Lietz Pocket Transits.)
- Furnished with soft leather case



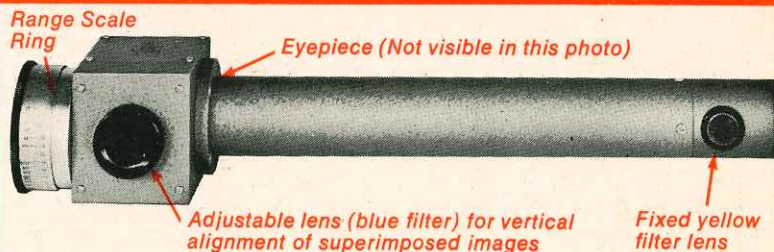
Specifications for No. 8026-15 — 500 mm Baseline

Measurable range: 29ft to 1000ft
 Measuring Accuracy:
 ± 1% up to 300 feet
 ± 2% 300 to 500 feet
 ± 5% 500 to 1000 feet
 Telescope Magnification: 4X
 Viewing angle: 6.5°
 Base line length: 19.7" (500 mm)
 Total length: 23"
 Weight: 2.8 lbs.

Range Scale:		Visual interpolation
Distance	Increment	
29ft to 40ft	1 ft.	0.1 ft.
40 to 80	2	0.2
80 to 150	5	0.5
150 to 200	10	1.0
200 to 300	20	2.0
300 to 500	50	5.0
600, 750, 1000, ∞		

SPECIFICATIONS FOR METRIC RANGE FINDERS ARE COMPARABLE TO THE CORRESPONDING ENGLISH EQUIVALENT

Specifications for No. 8026-18 — 300 mm Baseline



Measurable range: 25ft to 1000ft
 Measuring Accuracy:
 ± 1% up to 150 feet
 ± 2% 150 to 300 feet
 ± 5% 300 to 1000 feet
 Telescope magnification: 4X
 viewing angle: 6.5°
 Base line length: 11.8" (300 mm)
 Total length: 15.7"
 Weight: 2.3 lbs.

Range scale:		Visual interpolation
Distance	Increment	
25ft to 30ft	0.5 ft.	0.05 ft.
30 to 50	1.0	0.1
50 to 80	2.0	0.2
80 to 150	5.0	0.5
150 to 200	10.0	1.0
200 to 300	20.0	2.0
300 to 500	50.0	5.0
600, 750, 1000, ∞		

OPERATION

The rangefinder is held in the left hand in approximately horizontal position and sighted at the target through the eyepiece. Focusing is accomplished by turning the eyepiece knob.

A double image will be seen with one part in yellow and the other in blue. The blue image can be moved laterally by turning the range scale ring while keeping the yellow image approximately in the center of the viewing area.

When the two images exactly coincide, the range scale ring will indicate the correct distance — either horizontally or diagonally if the measurement is made along an inclined plane.

Rangefinders

OPTICAL TAPEMEASURE



The instrument of a thousand uses. That's how the OPTICAL TAPEMEASURE has been described by contractors, estimators, professional engineers, real estate agents and handymen alike. Weighing a mere seven and one-half ounces, the pocket-sized measuring device is easy to use and accurate. It was developed by the leading manufacturer of precision distance-measuring equipment, for a wide variety of uses . . . and it's surprisingly inexpensive, reliable, completely portable and fast.

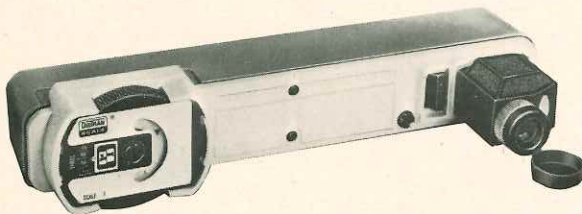
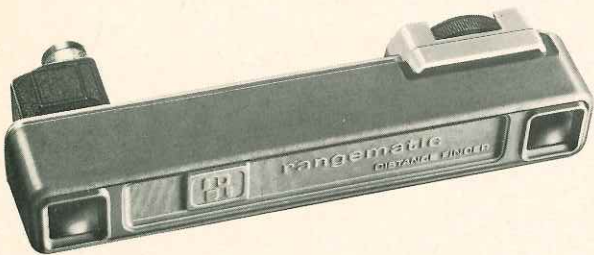
You can determine the distance inside or outdoors, across water, the height of a building or a tree, the size of a room or building lot . . . an unlimited number of other uses. And without a tape measure. Or someone else to help.

Simply choose an object to focus on, adjust the knob until a sharp image appears in the viewfinder, and read the scale. It's as quick as that! The popular OPTICAL TAPEMEASURE carries a five-year warranty, features precision-welded inner construction, shock-absorbing optical mounts and a dust-free interior.

It is capable of accurate distance-measuring from 6 to 100 feet. Average accuracy: 99.2% up to 25 feet, 97.8% up to 100 feet. Size 5½ x 3¼ x 1⅛ inches. Weight 7 ounces. Comes complete with vinyl carrying case.

Stock No. 8031-10 Optical Tapemeasure Each,

RANGEMATIC DISTANCE FINDER



Similar to the OPTICAL TAPEMEASURE but designed for longer measurements. Available in three models, the Model 400 which measures 100 to 400 feet, the Mark VI which measures 19 to 250 yards and the Mark V which measures from 50 to 1000 yards. Metric models are also available for the Mark V and Mark VI.

These rugged instruments are equipped with reinforced fiberglass casings, welded steel construction and precision-mounted, shock-absorbing optical units. They have dust-free interiors and are insensitive to humidity, altitude and temperature changes. Highlighting the features of these precision instruments is the ease and speed with which distances can be calculated for determining acreages, finding distances over water, measuring over rough terrain, survey layout work. All calculations can be made by one person, without moving an inch. And a plus! The instruments come equipped with a detachable 6-power scope which can be used separately as a telescope. Two year warranty.

Accuracy: RANGEMATIC MODEL 400		100 to 400 feet	99% at 100 feet 98% at 200 feet 97% at 300 feet 95% at 400 feet
RANGEMATIC MARK V		50 to 1000 yards	99% at 100 yards 95% at 500 yards 90% at 1000 yards
MARK V (Metric)		50 to 1000 meters	99% at 100 meters 95% at 450 meters 90% at 900 meters
RANGEMATIC MARK VI		19 to 250 yards	99% at 100 yards 97% at 250 yards
MARK VI (Metric)		19 to 250 meters	99% at 100 meters 97% at 250 meters

Size — 10¾ x 2 x 1¾ inches. Weight 22 ounces.

Stock No. 8031-20 RANGEMATIC 400, 100 to 400 feet . . . Each,

Stock No. 8031-30 RANGEMATIC V, 50 to 1000 yards . . . Each,

Stock No. 8031-31 RANGEMATIC V (Metric) 50 to 1000 meters . . . Each,

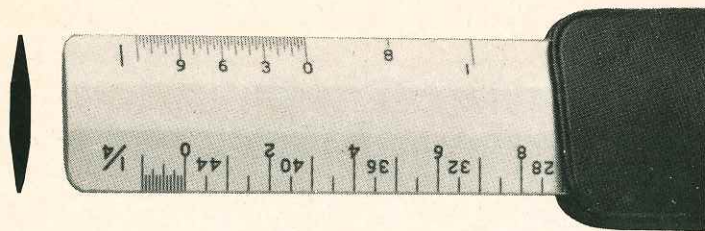
Stock No. 8031-40 RANGEMATIC VI, 19 to 250 yards . . . Each,

Stock No. 8031-41 RANGEMATIC VI (Metric) 19 to 250 meters . . . Each,

Stock No. 8031-49 Vinyl Carrying Case for RANGEMATIC . . . Each,



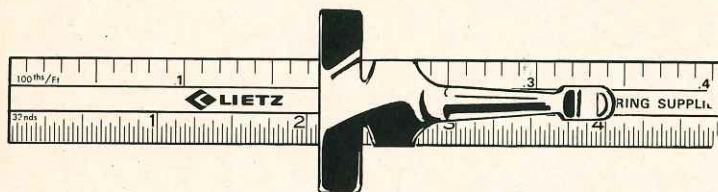
Pocket Scales



PLASTIC WITH SHEATH

Six-inch, four-bevel white plastic, engine divided. With leather sheath. Packed 12 per box.

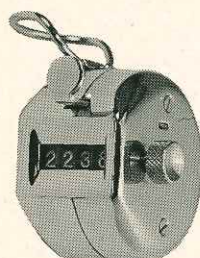
Stock No. 3270-21	1/8, 1/4, 1/2, 3/8, 3/4, 1, 1 1/2, 3 inches to 1 ft.	Each,
Stock No. 3272-21	10, 30, 40, 50 parts to the inch	Each,
Stock No. 3274-21	10, 20, 40, 50 parts to the inch	Each,
Stock No. 3276-21	Metric Scale 1:1:20:25:50	Each,



POCKET DEPTH SCALE

Stainless steel with graduations on each side of four edges: 10ths and 100ths of a foot; inches to 32nds; inches to 16ths and millimeters. 6 1/4 inches overall with sliding pocket clip. Also has conversion factors—_inches to decimals of foot.

Stock No. 3276-00	Each,
-------------------	-------



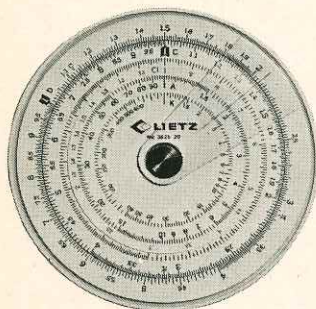
TALLY REGISTER

Four-digit capacity with quick return to zero. Compact, chrome-plated brass case fits hand snugly and comfortably. Precision construction assures effortless, trouble-free use.

Stock No. 8792-00	Each,
-------------------	-------



Computers and Converters



POCKET SLIDE RULE

Only 3 1/4" in diameter, yet this rule has all the scales and all the accuracy of a full-size instrument. Has D, C, C1, A and K scales which permit multiplication, division, inverse proportions, joint multiplication and division, squares and square roots. And since scales are endless, the answer will never overlap the end of the scale. Furnished with attractive case and instruction book. Reverse side has handy conversion tables.

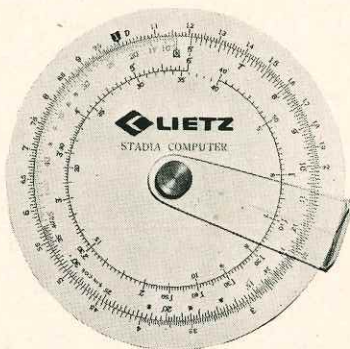
Stock No. 3625-20	Each,
-------------------	-------

STADIA COMPUTER

Expanded "sin cos" and "cos²" scales enable you to make direct calculation of both horizontal distance between the instrument and the object of measurement, and also the difference in vertical height. Reverse side is a standard 3 3/4" circular slide rule with D, C, S, ST and L scales. Furnished with case and instructions.

Stock No. 3626-25	Each,
-------------------	-------

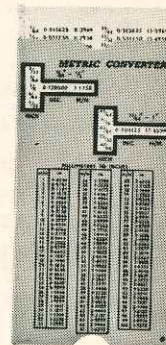
Note: Both of these instruments are made of specially-developed stable plastic that won't shrink or expand even under adverse climatic conditions.



METRIC CONVERTER

Just pull the slide to convert fractions of inches (from 1/64" to 1") to decimals and to metric. Also converts decimals of inches (from .01" to 1") to metric. Includes conversion table of millimeters to decimals of inches. Heavy plastic. Overall size: 2-15/16" x 5-3/4".

Stock No. 3625-40	Each,
-------------------	-------



METRI-KIT

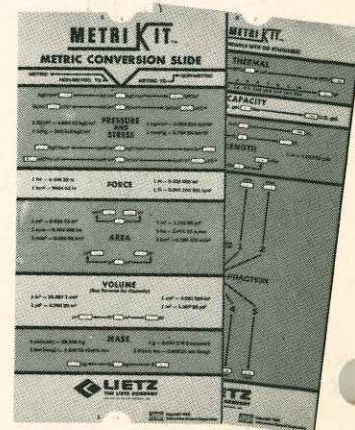
Gives fast and extremely accurate conversion of 15 measurement systems from metric to U.S. equivalents and vice versa. Included are units of pressures and stress, area, volume, mass, thermal, capacity and length.

Converts values up to 6 decimal places. Designed in accordance with ISO standards. Also includes 24 conversion constants.

Measures a big, easy-to-read 5 1/2" x 10" and is made of durable, heavy plastic.

Complete with instructions and protective plastic sleeve.

Stock No. 3625-45	Each,
-------------------	-------



Rolatype

Measuring Wheels

MODEL 200

For all indoor measuring, outdoors on hard surfaces. Built-in totalizer and recessed scale record feet and inches at normal walking speed. Audible click indicates each two feet measured; loud bell indicates each 100 feet. Only 7½ inches in diameter, weight 2¾ lbs. 34 inch handle retracts for easy carrying. Safety Glow (red) finish, with leather carrying case.

Stock No. 8310-00 Mfr. No. 200 Each,

MODEL 112 MEASURE METER

Precision counter records feet and inches, up to 10,000 feet without resetting. To subtract from total, simply back it up. 40" handle contracts to 24"; weight only 3½ pounds. Hard rubber calibrated dual wheels. Preferred by Police and Traffic Departments because of its utility and sturdy construction.

Stock No. 8310-11 Mfr. No. 112 Calibrated in feet and inches Each,
Stock No. 8310-10 Mfr. No. 110 Calibrated in feet and tenths Each,

MODEL 45 MEASURE MASTER

Has precision counter with pushbutton for resetting to zero. Records in feet and inches — up to 1000 feet. Forward movement adds; reverse movement subtracts. Handle extends from 20" to 38"; 4" wheel diameter. Weighs only 3 pounds.

Stock No. 8310-17 Mfr. No. 45 Calibrated in feet and inches Each,
Stock No. 8310-18 Mfr. No. 45T Calibrated in feet and tenths Each,
Stock No. 8310-19 Mfr. No. 45M Calibrated in meters and decimeters Each,

MODEL 12 MEASURE MASTER — MARK II

Pushbutton counter records up to 1,000 feet and resets to zero automatically. 38 inch tubular handle contracts to 21 inches. Completely-sealed counter mechanism is easy to read. Wheel circumference 1 ft., diameter 4 inches. Weighs less than 2 lbs.

Stock No. 8310-15 Mfr. No. 12 Calibrated in feet and inches Each,
Stock No. 8310-16 Mfr. No. 10 Calibrated in feet and tenths Each,

MODEL 400

For longer distances, precisely records up to 100,000 feet over uneven and irregular terrain without resetting. Wire spoke wheel. Counter records to feet with accurate estimation to inches. Wheel circumference 4 ft., diameter 15½ in., weight 9 lbs. Built-in stand keeps wheel in upright position. Handle folds for storage or transport in car trunk. Automatic brake prevents backtracking. Orange color.

Stock No. 8310-40 Mfr. No. 400 Each,
Stock No. 8310-42 Mfr. No. 400D Same as Model 400 but with dual counters — one to record short runs and the other to accumulate totals Each,

MODEL 415

Same as Model 400 except with solid plated steel disc wheel calibrated to ½ inches on one side and ½ of one-tenth foot on the other side. Orange color.

Stock No. 8310-20 Mfr. No. 415 Each,
Stock No. 8310-22 Mfr. No. 415-D Same as Model 415 but with dual counters — one to record short runs and the other to accumulate totals Each,

Carrying Case for Model 400, Model 415.

Stock No. 8310-41 Each,

Complete line of Rolatypes available from Lietz.



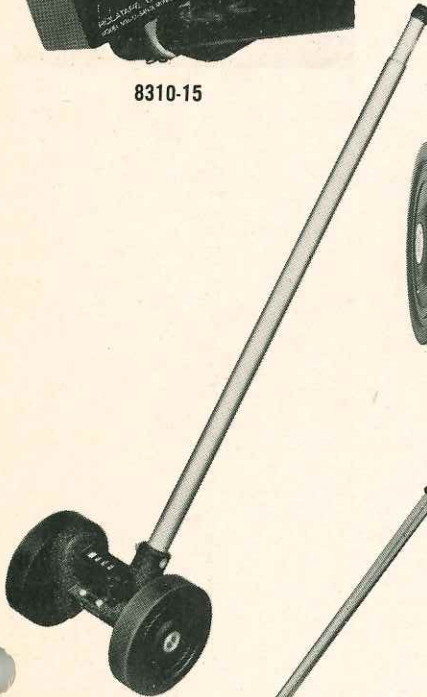
8310-15



8310-00



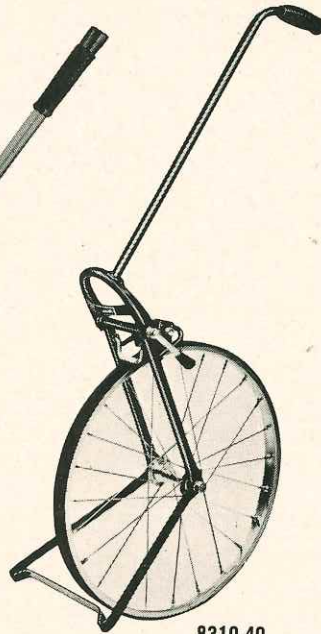
8310-17



8310-11



8310-05



8310-40

MODEL 30 MEASURE MASTER

A versatile, lightweight wheel suitable for both indoor and outdoor work. Wheel circumference 3 ft., diameter 11¼ in., weight 3¼ lbs. Orange color. Counter records feet and inches up to 1000 ft. without resetting. 38 in. handle retracts to 19 in.

Stock No. 8310-05 Mfr. No. 30 Each,
Stock No. 8310-07 Mfr. No. 50 Same as Model 30 except circum. 5 ft., diam. 19 in., weight 5 lbs. Recommended for outdoor work Each,
Stock No. 8310-09 Mfr. No. 394 Same as Model 30 except circum. 1 M., diam. 0.317 M. Records 1000 M. in meters and decimeters Each,

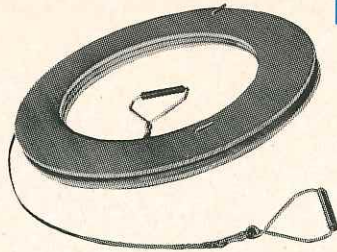
MODEL 623

Identical in construction to Model 400 except wheel circumference 6 ft., diameter, 23 in. Measures cross-country and crease measurements either on foot or by car. Precision totalizer accurately records up to 100,000 feet without resetting over rough or uneven terrain.

Stock No. 8310-62 Mfr. No. 623 Each,
Stock No. 8310-63 Carrying case for Model 623 Each,

Lufkin

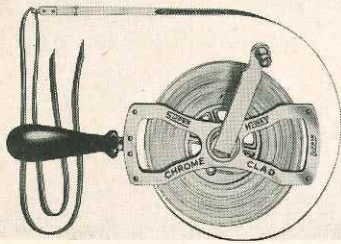
MINVAR 1/4"



Made from a special alloy, these base line tapes have a coefficient of expansion only 1/30 that of other fine steel tapes. Extremely fine graduations (between .002" and .004") assure maximum accuracy in critical measurements. Graduations start approx. 12" from beginning of line which has strong eyelets at terminal points for tensioning devices.

Catalog No. 8100 Length 100' Each,

SUPER HI-WAY — Chrome Clad — 5/16"



Finest quality chain tape made—for the engineer who wants the very best. Extra heavy chrome-plated line is 5/16" wide, .025" thick. Permanent markings are of raised

steel, protected by raised border. Easy-to-read graduations are chrome against a black background.

Each 100' length has last foot graduated in 10ths and 100ths of feet. For example, a 200' tape is graduated from 99' to 100' and from 199' to 200' in 10ths and 100ths of feet.

Catalog No.

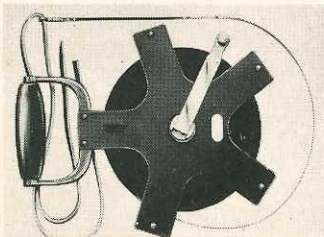
Line Only Style B	Line Length	Each	Reel Required Specify if desired
OC9100B	100'		31-100
OC9200B	200'		31-200 or 61-200
OC9300B	300'		31-300 or 61-300

SUPER HI-WAY — Nubian (Black) — 5/16"

Same as Super-Hi-Way except etched markings. Bold bright graduations against black background.

Catalog No.

Line Only Style B	Line Length	Each	Reel Required Specify if desired
09100B	100'		31-100
09200B	200'		31-200 or 61-200
09300B	300'		31-300 or 61-300



CANYON — Nubian (Black) — 1/8"

This lightweight, rugged tape, 1/8" wide and .025" thick is extremely useful when minimum weight and wind resistance are important factors. Widely used in spanning bridges, valleys

or canyons. Permanent black markings are etched into raised bright steel portion of line. Plated brass end clips are reinforced.

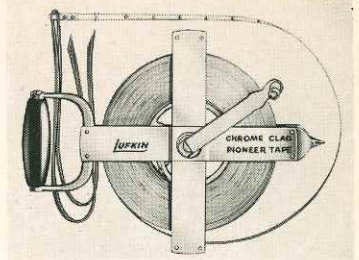
Catalog No.

Line Only Style B	Line Length	Each	Reel Required Specify if desired
04200B	200'		41-200
04300B	300'		41-300
04500B	500'		41-500

STYLE B — Blank space at each end. Extra foot before zero subdivided to 10ths and 100ths, numbered from right to left; balance graduated every foot except last foot is in 100ths.

Tapes

PIONEER — Chrome Clad — 1/4"



Lightweight and easy to handle, this chrome clad line, 1/4" wide and .020" thick, combines strength and accuracy. Easy to pull because of weight and line width. Catenary problems (sag due to unsupported weight of tape line) are minimized. Permanent markings are raised steel, protected by a raised steel border, as illustrated. Easy-to-read markings are chrome against a black background.

Each 100' length has last foot graduated in 10ths and 100ths of feet. For example, a 200' tape is graduated from 99' to 100' and from 199' to 200' in 10ths and 100ths of feet.

Catalog No.

Line only Style B	Line Length	Each	Reel Required Specify if desired
OC5100B	100'		31-100
OC5200B	200'		31-150 or 61-200
OC5300B	300'		51-300 or 61-300
OC5500B	500'		61-500

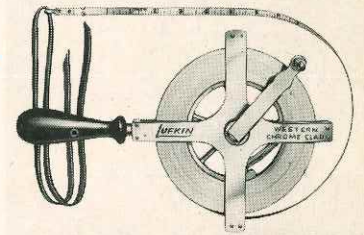
PIONEER — Nubian (Black) — 1/4"

Same as Pioneer chrome clad except black markings etched into raised bright steel portion of line.

Catalog No.

Line only Style B	Line Length	Each	Reel Required Specify if desired
05100B	100'		31-100
05200B	200'		31-150 or 61-200
05300B	300'		51-300 or 61-300
05500B	500'		61-500
05100M	30 Meter		31-100
05164M	50 Meter		31-150, 61-200

WESTERN — Chrome Clad — 1/4"



Finest engineers chrome clad tape available, 1/4" wide and .015" thick. Graduated in feet, 10ths and 100ths feet throughout. Jet black markings bonded to steel surface and recessed below hard chrome surface. Provided with blank space each end.

Catalog No.

Tape w/Reel	Length	Each	Refill Only	Each
C1676D	100'		OC1676D	

PEERLESS — Chrome Clad — 1/4"

Like Western chrome clad except line is .012" thick. Zero falls at end of line. Ring at zero end. Graduated in two styles: Feet in eighths or ft., 10ths, 100ths.

Catalog No.

Tape w/Reel	Length	Each	Refill Only	Each
C1276D	100' (10ths)		OC1276D	
C1278D	200' (10ths)		OC1278D	
C1276	100' (inches)		OC1276	
C1278	200' (inches)		OC1278	

Lietz stocks the more popular Lufkin Chain and Case Tapes. Other Lufkin items available on special order.

Lufkin Tapes

Series	Operation	Catalog Number	Blade Dimensions	Blade Style	Refill Blades	Each
LoKmatic white clad	Automatic return positive locking	W7210	1/2" x 10'	A-1	RW10	
		W7212	1/2" x 12'	A-1	RW12	
		W7312	3/4" x 12'	A-2	RW312	
		W7316	3/4" x 16'	A-3	RW316	
Mezurall white clad	Manual	W9210	1/2" x 10'	A-1	RW10	
		W9212	1/2" x 12'	A-1	RW12	
		W9310	3/4" x 10'	A-2	RW310	
		W9312	3/4" x 12'	A-2	RW312	
		W9210D	1/2" x 10'	A-5	RW10D	
		W9210ME	1/2" x 3M	A-4	RW10ME	
Executive white clad	Manual	W606ME	1/4" x 2M	A-13	—	
		W606	1/4" x 6'	A-11	—	
		W608	1/4" x 8'	A-11	—	
Architects white clad	Spring return Manual	W393	1/4" x 5'	B-6	—	
		W605A	1/4" x 5'	B-6	—	
Mezurlok		W933MD	3/4" x 3M	Metric graduations upper edge. 10ths, 100ths foot lower edge.		

MARKINGS

A-1 Black and red markings one side only. Feet and inches to 16ths top edge. Consecutive inches to 16ths bottom edge; first 12 inches to 32nds. Color blocks designate feet and 16" centers.

A-2 Marked both sides. Same as A-1 on top side. Back marked in black with direct-reading inside measure on top edge. Ten reference tables on balance of blade.

A-3 Black markings one side only. Feet and inches to 16ths top edge. Consecutive inches to 16ths bottom edge; first 12 inches to 32nds; 16" centers designated.

A-4 Black markings one side only. Millimeters on upper edge. Inches to 16ths on lower edge; first 12 inches to 32nds.

A-5 Black markings one side only. Feet, 10ths, 100ths feet on top edge. Feet, inches, 16ths on bottom edge. First 12 inches bottom edge to 32nds.

A-11 Black and red markings one side only. Consecutive inches to 16ths; first 12 inches to 32nds, bottom edge only. Foot figures in red; 16" centers designated.

A-13 Black markings on one side. Millimeters lower edge; inches to 16ths on upper edge. First 12 inches to 32nds.

B-6 Marked both sides. One side 1/4 inch scale (1 to 240); other side 1/8 inch scale (2 to 480). Blank space first end.

Lietz stocks the more popular Lufkin Chain and Case Tapes. Other Lufkin items available on special order.

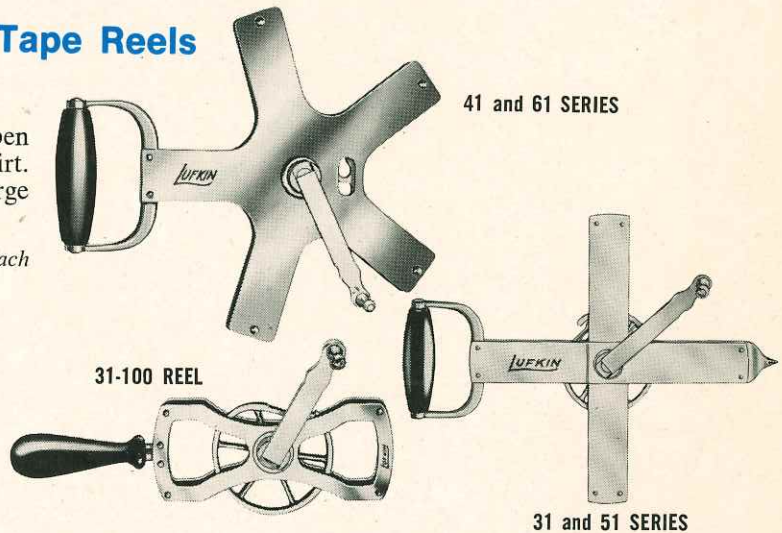
Tape Reels

Feature nickel-plated reels with hardwood handles. Open design construction aids in drying line and clearing out dirt. Long, easy-action winding handles lock at any point. Large drums for faster rewind; tape attaches easily to reel.

Reel No.	Each	Reel No.	Each
31-100		41-200	
31-150		41-300	
31-200		41-500	
31-300		61-200	
51-300		61-300	
		61-500	

Reel No. 12-150 for C1676D and C1276D Each,
Reel No. 12-200 for C1278D Each,

31-100 REEL (100 ft. length)
31 and 51 SERIES REELS (over 100 ft. lengths)
41 and 61 SERIES REELS (200, 300 and 500 ft. lengths)



Recognized as one of the finest, most accurate folding rules available. Inside markings in feet, 10ths and 100ths of feet; outside markings in feet, inches and 16ths of an inch. Foot numbers in red repeated each inch and 10th of foot. New decimal points on engineers scale prevent reading errors.

Catalog No. 066D 6-foot Each,

Six-foot, *extra-heavy*, end-folding rule with same markings as No. 066D

Catalog No. 1066D Each,

METRIC-ENGLISH

12-fold, metric-English, marked millimeters on outside, lower edge only. Consecutive inches to 16ths on inside, upper edge only.

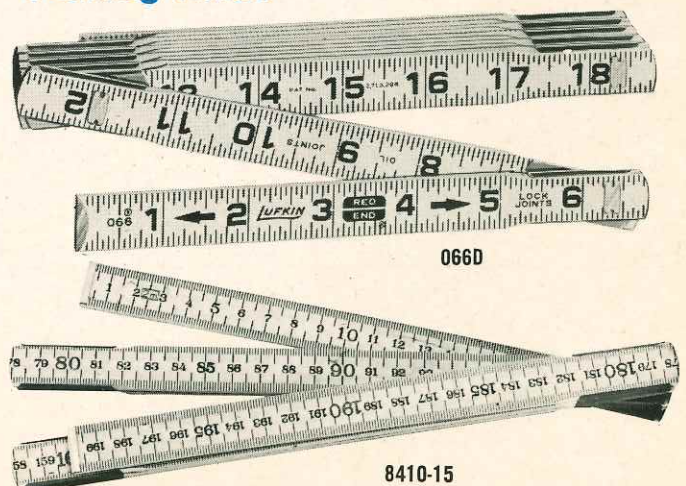
Catalog No. 062ME 2 meters Each,

METRIC-ENGINEERS

Lietz 6 section folding spring-joint rule. Graduated feet, tenths and 100ths on one side to six feet, opposite side graduated in millimeters and centimeters to 2 meters (200 cm). An added feature on the 2nd and 4th section are marks which allow alignment of the rule at accurate angles of 45° and 90°.

Stock No. 8410-15 Each,

Folding Rules



LUFKIN "HI-LINE" NON-METALLIC WOVEN TAPES



The Improved Non-Metallic Tape

- New Heavy Vinyl Covered Case • Extra Strong Dacron Line
- Red & Black Markings • Reinforced End • Rust Resistant Steel Case

Line $\frac{5}{8}$ " wide. An especially popular tape in public utility, general construction and highway work. Will not conduct electricity. Line is made entirely of strong dacron fibers. Graduations penetrate the fibers and are protected by a clear, water and abrasion-resistant plastic coating. "Instantaneous" reading. Bold red and black markings against a pure white background provide unexcelled readability. First 9" reinforced with long-wearing plastic (green to indicate non-conductivity).

Tapes listed with preceding letter H are provided with a folding hook on end ring.

Tape			Refill	
Cat. No.	Length	Graduations	Each	Cat. No. Each
403D	50'	Feet, 10ths		0403D
H403D	50'	and		0H403D
406D	100'	$\frac{1}{2}$ -10ths		0406D
H406D	100'			0H406D
403	50'	Feet, inches		0403
H403	50'	and		0H403
406	100'	$\frac{1}{4}$ -inches		0406
H406	100'			0H406

LUFKIN LIGHTWEIGHTS



All new case design is easy to hold, easy to handle with end hook that folds into contour to prevent snagging. Made of lightweight yet sturdy high-impact plastic; full-reel nylon drum for silky-smooth winding action. Easy-to-read blade is epoxy coated to resist wear and abrasion — stays easy to read.

Tape		
Cat. No.	Length	Graduations
50	50'	Feet, inches
100	100'	and $\frac{1}{4}$ -inches

LUFKIN UTILITY WHITE CLAD STEEL TAPES

Black markings on white finish. Feet, inches and 8ths. 16" centers indicated. One side only. Instantaneous reading. With hook ring.

Tape			Refill	
Cat. No.	Length	Graduations	Each	Cat. No. Each
HW50	50'	Feet, inches		0HW50
HW100	100'	and $\frac{1}{8}$ inches		0HW100

LUFKIN "BANNER" WHITE CLAD STEEL TAPES



Line $\frac{3}{8}$ " wide with epoxy finish to protect against abrasion. Hook end reads direct from zero. Marked one side only; foot numbers repeat in red each inch; 16" centers marked. Welded steel case with vinyl cover. Marked Feet, Inches and 8ths.

With Hook-Ring			Refill	
Catalog No.	Length	Each	Catalog No.	Each
HW220	25'		0HW220	
HW223	50'		0HW223	
HW226	100'		0HW226	

METRIC-ENGLISH "BANNER" TAPES

One side graduated in feet and inches to 8ths, other side graduated to centimeters with the first decimeter to millimeters.

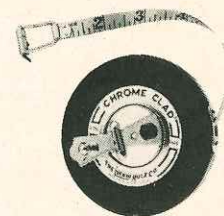
With Hook-Ring			Refill	
Catalog No.	Length	Each	Catalog No.	Each
W223ME	15 Meters		0W223ME	
W226ME	30 Meters		0W226ME	

LUFKIN ENGINEERS WHITE CLAD STEEL TAPES

Line $\frac{3}{8}$ " wide. Easy to read. Jet black figures and graduations on snow white surface. Marked one side only — Feet, 10ths and 100ths Feet.

With Hook-Ring			Refill	
Catalog No.	Length	Each	Catalog No.	Each
HW-223D	50'		0HW223D	
HW-226D	100'		0HW226D	

LUFKIN "ANCHOR" CHROME CLAD STEEL TAPES



Line $\frac{3}{8}$ -inch wide. Ideal for general use, accurate, rust and corrosion resistant, Chrome Clad finish. Final added protection against wear and abrasion is provided by a flowed-on, transparent epoxy coating. Permanent jet black markings, with "instantaneous" reading foot markings at every inch or 1/10-ft. interval. Tan vinyl case. Marked one side only.

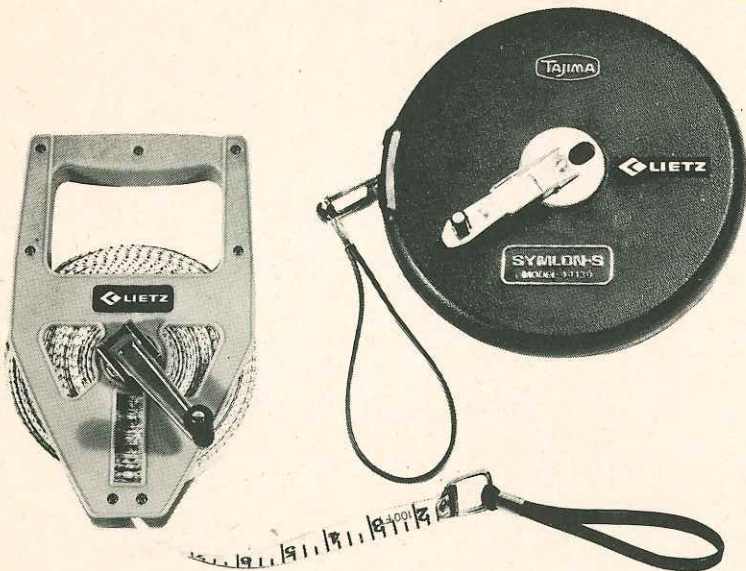
Tape			Refill Only	
Cat. No.	Length	Graduations	Each	Cat. No. Each
HC213	50'	Feet, inches		0HC-213
HC216	100'	and $\frac{1}{8}$ inches		0HC-216
HC213D	50'	Feet, 10ths		0HC-213D
HC216D	100'	and 100ths		0HC-216D

Lietz stocks the more popular Lufkin Chain and Case Tapes. Other Lufkin items available on special order.



"Symlon" Fiber Glass Tapes

- ☐ Practically indestructible
- ☐ Tough vinyl fiberglass
- ☐ More flexible than cloth
- ☐ No expansion or contraction due to temperature changes
- ☐ Absolutely non-conducting
- ☐ Accurate wet or dry
- ☐ Tearproof—won't split or snap even in sub-zero temperatures



SYMLON fiber glass tapes are made to exacting Lietz specifications, and have unbelievable durability and stability. They will not shrink, stretch or deteriorate. They are impervious to water or mud and not affected by constant creasing... won't split or snap even in sub zero temperatures.

Their special fiber glass body is so rugged you can drag it over rocks or even run over it with a truck! And fiber glass is completely non-conducting making these tapes ideal for public utilities, highway and all types of construction work.

Best of all—through even the hardest beating, SYMLON tapes maintain their new look and their accuracy.

Tape width is 15 mm (19/32").

Red and black continuous graduation—one side only—in feet, inches and 1/4 inches.

Stock No.	Description	Each	Refill	Each
8473-30	50 ft. Tape with case		8473-31	
8473-60	100 ft. Tape with case		8473-61	
8473-70	100 ft. Tape with reel		8473-61	
8473-80	150 ft. Tape with reel		8473-81	

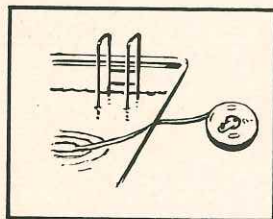
Red and black continuous graduation—one side only—in feet, tenths and 1/2 tenths.

Stock No.	Description	Each	Refill	Each
8473-32	50 ft. Tape with case		8473-33	
8473-62	100 ft. Tape with case		8473-63	
8473-72	100 ft. Tape with reel		8473-63	
8473-82	150 ft. Tape with reel		8473-83	

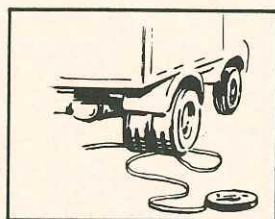
Red and black continuous graduation—one side only—in meters, centimeters and 2 mm.

Stock No.	Description	Each	Refill	Each
8473-34	10 meter Tape with case		8473-35	
8473-36	20 meter Tape with case		8473-37	
8473-64	30 meter Tape with case		8473-65	
8473-74	30 meter Tape with reel		8473-65	
8473-84	50 meter Tape with reel		8473-85	

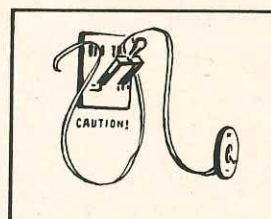
8473-96 Replacement reel only for 100 ft.
8473-97 Replacement reel only for 150 ft.



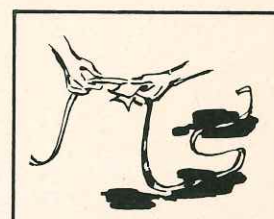
ACCURATE WET OR DRY



DURABLE



NON-CONDUCTING



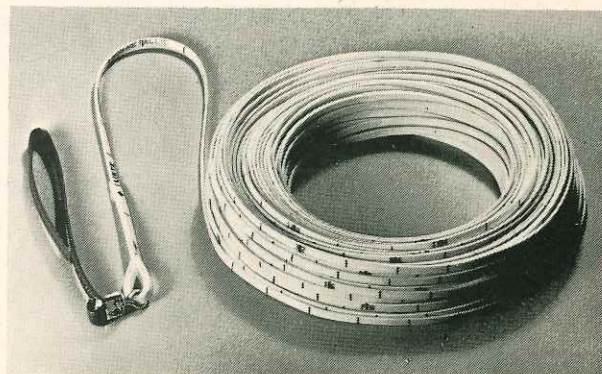
EASY TO CLEAN



Utility Fiber Glass Tapes

Similar to the Lietz SYMLON Tapes except approximately 7/32" wide and 3/32" thick with continuous black graduations and red numeral foot marks. Printed one side only and protected by a tough, transparent vinyl covering. This tape is not supplied with a reel, but lends itself readily to use as a hand-looped, drag-type tape.

Stock No.	Description	Each
8450-20	200 ft., graduated in feet and inches	
8451-21	200 ft., graduated in feet and 10ths	
8450-30	300 ft., graduated in feet and inches	
8451-31	300 ft., graduated in feet and 10ths	

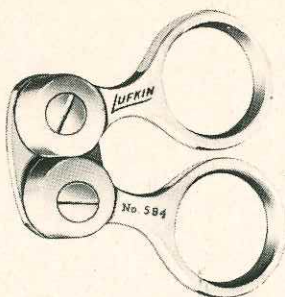


Lufkin | Tape Accessories

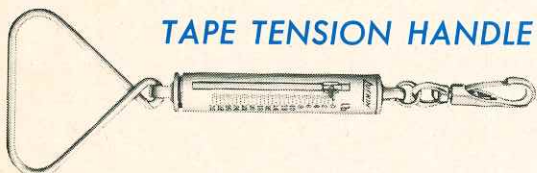
TAPE CLAMP HANDLE

Provides positive, quick and safe grip of a steel tape at any point so that light or heavy tension can be applied and held.

Catalog No. 584 Each,



TAPE TENSION HANDLE



Applies exact tension at which a steel tape is standard. Each has dual graduations, pounds to 1/2 pounds, kilograms to 250 grams.

Catalog No. 586 30 lbs, 15 Kg. Each,
Catalog No. 586D 50 lbs., 25 Kg. Each,

TAPE RING



Nickel-plated steel 1 1/8" diameter for 1/4" tapes only. Prevents kinking; adds to tape life.

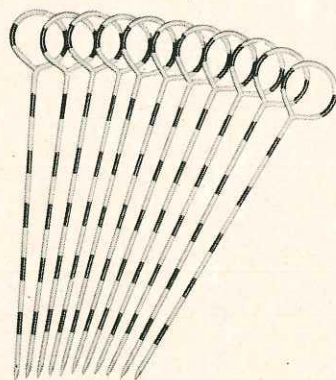
Catalog No. 580 Each,

CHAINING PIN CARRYING RING



3/16" round steel; 6" diameter. White enamel finish.
Catalog No. 596 Each,

CHAINING PIN SET (SURVEYORS ARROWS)



3/16" hardened round steel; 14" long. Red and white. Set of eleven.

Catalog No. 8183-00 Each,

Catalog No.	Description	Each
580T	Leather Thongs (pair) 36 inches long	
597	Leather Arrow Quiver with 48" leather belt.	

Lufkin | Tape Repair Kits

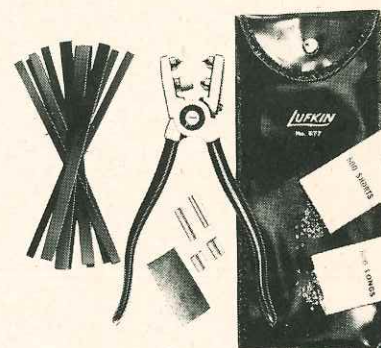
576 TAPE REPAIR KIT



A sturdy, practical kit for splicing steel tapes of all kinds, widths and weights. Contains punch and riveting block with piercing punch; cutting snips; riveting hammer; steel tape repair pieces of various kinds, widths, weights and markings including Chrome Clad, Nubian (black), with and without rings; rivet set, tweezers, extra piercing punch; 1 lot solid steel rivets in a box. All in compact case.

Catalog No.	Description	Each
576	Tape Repair Kit, complete	
576B	Punch Block w/piercing punch	
576D	Rivets only, long, 1000 in box	
576F	Rivet Set	

577 TAPE REPAIR KIT



Contains punch and eyeletting tool; supply of long and short eyelets; assortment of ungraduated steel tape pieces; 4 Eureka repair sleeves (2 each of 1/4" and 5/16") all in handy leatherette case.

Catalog No.	Description	Each
577	Tape Repair Kit, complete	
577C	Extra Eyelets, 500 short in box	
577D	Extra Eyelets, 500 long in box	

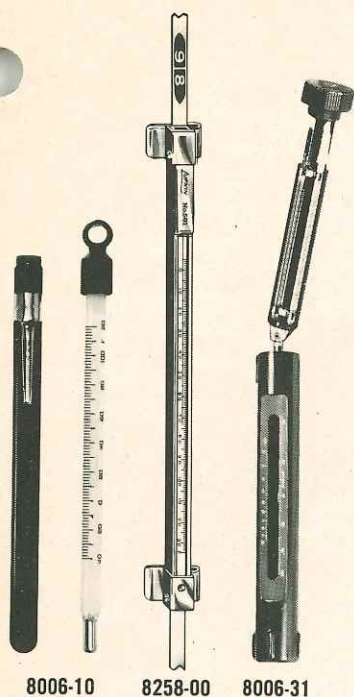
EUREKA TAPE REPAIR SLEEVES

Thin, sheet metal sleeves are pre-coated with solder and flux enabling tape repairs to be made in the field with just a match. Twelve sleeves in small carrying box.

Specify Catalog No. 577K for 1/8" tapes; 577P for 3/16" tapes; 577T for 1/2" tapes; 577M for 1/4" tapes; 577R for 3/8" tapes. Box,



Thermometers

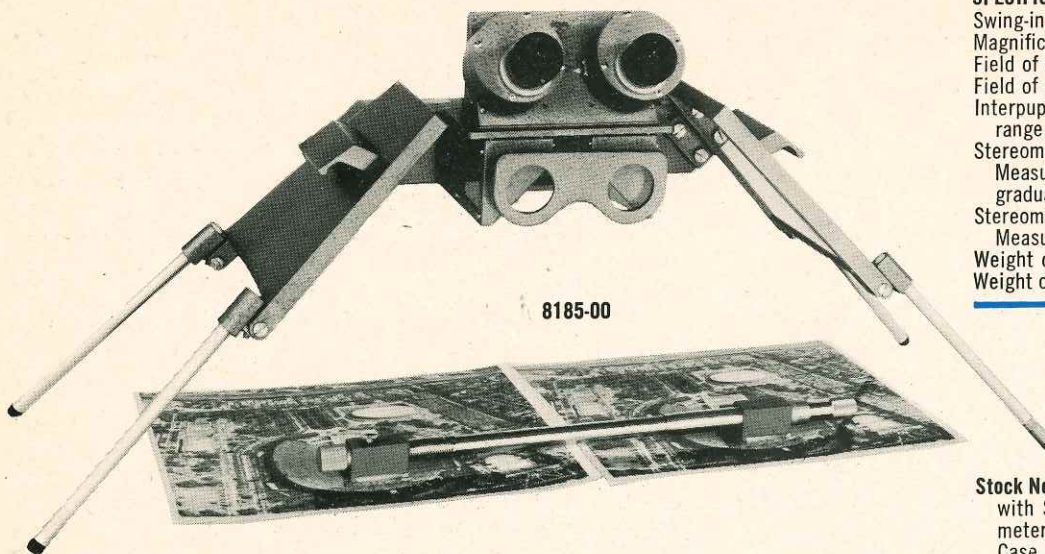


Stock No.	Mfr. No.	Description	Each
8006-10	21410-1	Pocket Thermometer. Plastic case; 5½ inches long. Mercury filled. Range —40° to +120° F. in 2° increments. Non refillable.	
8006-15	21411-1	Glass refill for old metal case style pocket thermometer.	
8006-11	21430-1	Pocket Thermometer. Plastic case; 5½ inches long. Mercury filled. Range —40° to +50° C. in 1° increments. Non refillable.	
8006-16	21431-1	Glass refill for old metal case style pocket thermometer.	
8006-20	21418	Same as No. 8006-10 except range 0° to 220° F. Non refillable.	
8006-25	21419-1	Glass refill for old metal case style pocket thermometer.	
8006-21	21438-1	Pocket Thermometer. Plastic case; 5½ inches long. Mercury filled. Range —15° to +105° C. in 1° increments. Non refillable.	
8006-26	21439-1	Glass refill for old metal case style pocket thermometer.	
8006-31	12-7011	Sling Psychrometer. 4¾" mercury filled thermometer recessed and protected by black plastic tube type case. Outside of case acts as handle while operating. Case has scale indicating % relative humidity. Range 20° to 120° in 1° increments.	
8006-36	12-0177	Extra engraved thermometer only for No. 8006-31.	
8258-00	581	Steel Tape Thermometer. The design of the nickel-plated steel case allows the vial bulb to rest against the tape surface. Spring clips hold the thermometer securely to the line. Temperature range is from —5° to +135° F., graduated in 1° increments. Vial is replaceable. Instruction sheet is included.	
8258-01		Glass refill for No. 8258-00.	

Magnifiers



Stock No.	Mfr. No.	Description	Each
8170-00	81-26-05	Pocket Size Magnifier with swinging leather case. Two-inch double convex lens. 2X. Accurately ground and highly polished.	
8170-20	720/27	Folding Magnifiers with lightweight, durable plastic case and frame. Single lens, 1 inch. 5X.	
8170-24	720/33	Single lens, 1½ inch. 4X.	
8170-26	81-23-53	Single lens, 1½ inch. 3X.	
8170-28	721/33	Double lens, 1¼ inch. 4X and 8X.	
8172-07	81-61-27	Highly-Corrected Pocket Magnifiers. Plastic mount with polished metal swing case.	
8172-10	81-61-31	Coddington. Good definition with wide field. Special single lens construction with internal diaphragm produces fine image quality.	
8172-14	81-61-35	1½-inch focus. 7X.	
8172-20	81-61-41	1-inch focus. 10X.	
8173-07	81-61-68	¾-inch focus. 14X.	
8173-10	81-61-71	½-inch focus. 20X.	
8173-14	81-61-75	Hastings Triplet — highly corrected for spherical and chromatic aberration; exceptionally wide field of view. The ultimate in magnifier quality.	
8173-20	81-61-80	1½-inch focus. 7X.	
		1-inch focus. 10X.	
		¾-inch focus. 14X.	
		½-inch focus. 20X.	



8185-00

SPECIFICATIONS:

Swing-in Magnifier:	1.5x
Magnification of Binocular:	3x
Field of view of Binocular:	70 mm (2.75")
Field of view of Stereoscope:	18 x 24 cm (7.1" x 9.5")
Interpupillary adjustment range:	55-75 mm (2.2" - 2.9")
Stereometer Parallax-Measuring Bar minimum graduation:	.05 mm (.002")
Stereometer Parallax-Measuring Bar range:	50 mm (1.97")
Weight of equipment:	8.8 lbs.
Weight of Wooden Case:	8.1 lbs.

This fine Lietz instrument is unmatched for precision and ease of use in viewing and interpreting aerial photographs. Elevations are seen with startling clarity in three dimensions and the instrument can be used for long periods of time without fatigue.

The distance of the reflecting mirrors has been widened to 27 cm and the field of view widened to 18 x 24 cm for improved viewing of 24 x 24 cm photographs. The three-power Binocular provides a bright, distortion-free optical system. A high-power 6x binocular is also available.

A convenient feature of the Lietz Mirror Stereoscope is the ease of adjustment for varying interpupillary distances and the fact that photographs need not be reoriented when such adjustment is made — an important asset when a number of persons are viewing the same photographs.

Through the use of the accessory Stereometer Parallax-Measuring Bar it is possible to measure accurately heights of buildings, mountains and all other landmarks appearing on aerial photographs.

The accessory Track Attachment permits work to be carried out over a much wider area and is particularly useful when working with multiple or continuous photographs. In addition, it permits the instrument to be used to draw contours and to function as a sketchmaster for making maps from photographs by means of parallel translation.

DOUBLE REFLECTING STEREOSCOPE

This stereoscope is ideal for education and research. It is designed to provide the same performance as the 8185-00 Mirror Stereoscope.

The Double Reflecting Stereoscope enables two operators to view the same pair of photographs simultaneously. Once the photographs are properly oriented they need not be moved when binoculars are adjusted to the requirements of the different operators — an important asset when a number of persons are viewing the same photographs.

Equipped with 1.5 power high performance binoculars providing a bright and distortion-free field of view. Included accessory is a Stereometer Parallax-Measuring Bar.

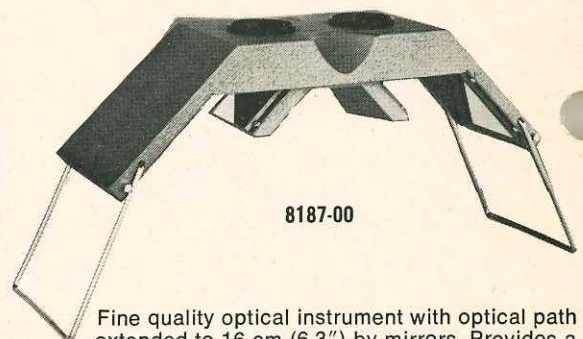
Stock No. 8186-00 Each,

SPECIFICATIONS:

Magnification:	1.5x
Field of View:	140 mm diameter (5.51")
Base length:	270 mm (9.45")
Eye span:	55 to 75 mm (2.2 - 2.9")
Parallax bar	
Measuring range:	50 mm (1.97")
Minimum scale (micrometer):	0.05 mm (.002")

Stereoscope body: 15¼" x 21½" x 8¾" high. Legs raise instrument approx. 9" above table top. Packed in wood case. Weight of equipment: 48 lbs. Weight of wooden case, 42.5 lbs.

SMALL MIRROR STEREOSCOPE



8187-00

Fine quality optical instrument with optical path extended to 16 cm (6.3") by mirrors. Provides a wide field of view; ideally suited to stereo photos. Field of view: 100 x 100 mm (3.9" x 3.9"). Magnification: 1.5X. Complete with wooden case. Weight of instrument 1.6 pounds. Weight of wooden case 1.6 pounds.

Stock No. 8187-00 Each,



8186-00

Stereoscope Accessories

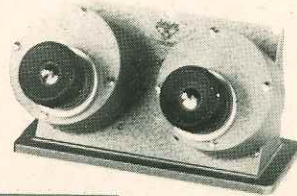


Stereometer Parallax-Measuring Bar permits accurate measurement of heights of buildings, mountains and all other landmarks appearing on aerial photographs. Dial indicator for ease and accuracy of reading. Glass plates have 3 color-coded targets for ease of use. Length 15.5" (39.5 cm.). Range 1.97" (50 mm.). Minimum graduation .002" (0.05 mm.). In wood case.

Stock No. 8185-07 Each,

Replacement Glass Plate for Stereometer.

Stock No. 8185-08 Each,

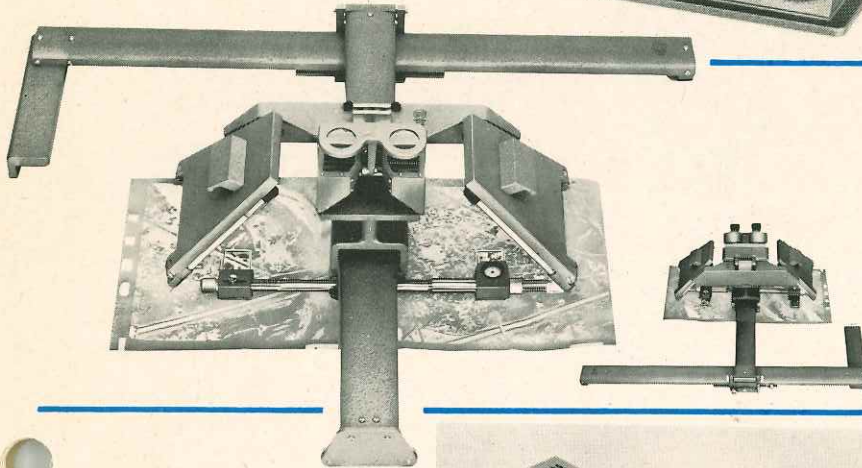


3-Power Binoculars provide distortion-free optical system with magnification.

Stock No. 8185-05 Each,

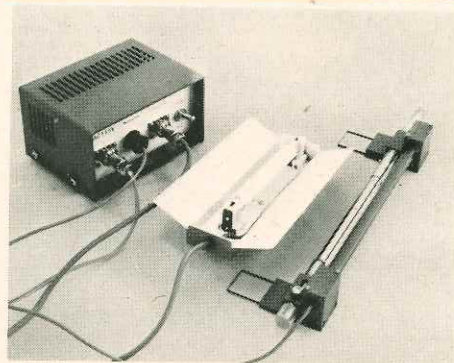
Same as above but 6-power.

Stock No. 8185-06 Each,



Track Attachment (shown with stereoscope) allows the simultaneous displacement of stereoscope and stereometer parallax measuring bar both vertically and laterally. This is particularly valuable for observation on multiple or continuous photographs since the whole area of the photographs can be examined without interruption.

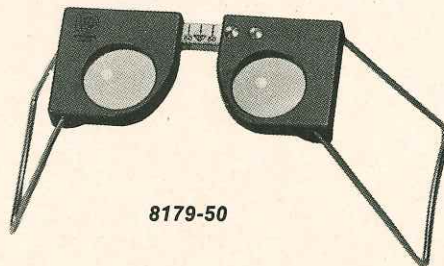
Stock No. 8185-10 Each,



Illumination Unit complete in wooden carrying case. Consists of a Stereometer Parallax-Measuring Bar wired for illumination; fluorescent lamp and shade and 110-120 volt power pack. In wood case.

Stock No. 8185-03 Each,

NOTE: The Illuminated Stereometer Parallax Measuring Bar supplied in the Illuminating Unit above is interchangeable with No. 8185-07 supplied with the complete unit No. 8185-00. The No. 8185-07 will not be supplied nor charged for if the No. 8185-00 and No. 8185-03 are ordered together.



8179-50



**POCKET
STEREOSCOPE**

2x magnification with interpupillary range from 55 mm to 72 mm. Covers prints up to 5 x 5 inches. Folds neatly into leather pocket case included.

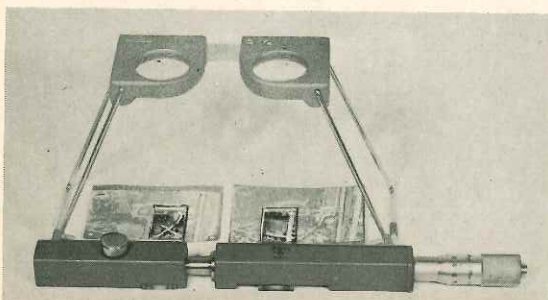
Stock No. 8179-50 Each,



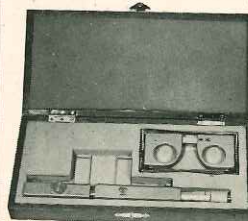
**HEIGHT FINDER
ATTACHMENT**

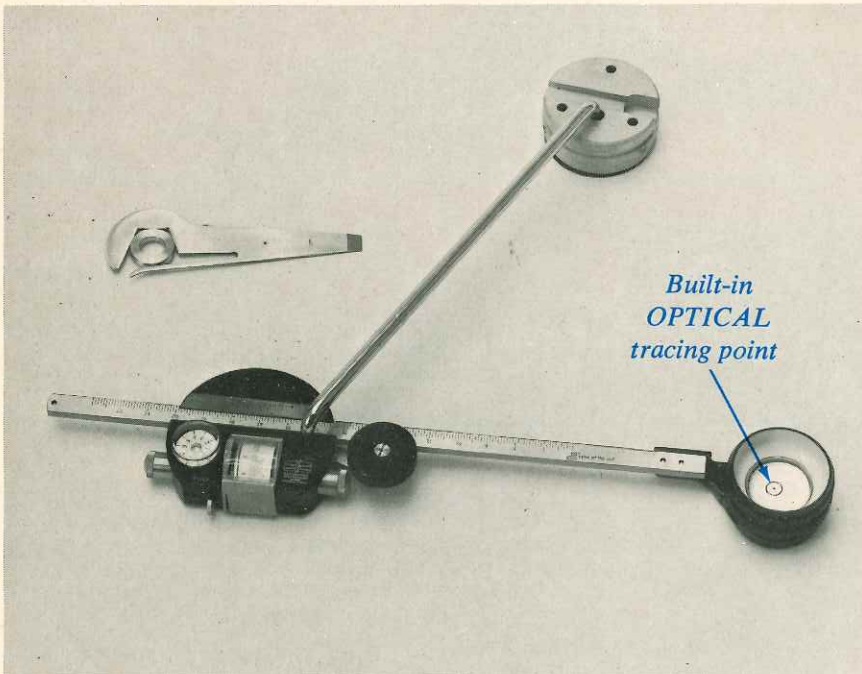
A stereometer parallax measuring bar for use with pocket stereoscope to determine relative heights of objects or terrain. Bar 11 inches long — maximum range 1 inch (25 mm) minimum graduation 0.01 mm. When two overlapping aerial photographs are properly oriented and viewed stereoscopically, the image displacement (parallax) can be measured and transformed into elevation values. Bar comes with clips for attachment to pocket stereoscope. Supplied in wooden case with space for stereoscope (stereoscope not included). Weight of unit in case 2¼ pounds.

Stock No. 8179-55 Each,



8179-55





These precision instruments are ideal for measuring plane areas of any shape or contour. Free-wheeling tracing ring has wide-angle lens with built-in tracing point. Finger-flick zero setting control. Accuracy of measurement $\pm .2\%$.

SPECIFICATIONS:

Free-wheeling tracing ring has wide angle 1.5x magnifying lens with built-in tracing point. Glides smoothly along outline — will not stick or tug and eliminates parallax.

Finger-flick zero setting control brings both wheels automatically to zero and eliminates need for initial reading and for handling measuring wheel.

Tracer arm of variable length is graduated in square inches (from 0.006 to 0.020). (English Model.)

Built-in optical tracing point.

Integrating wheel with shockproof device. Adjustable pin points of pole block insure stability. Weight, including case, 2 pounds.

Stock No. 3651-00 Mfr. No. 236A Optical Polar Planimeter (English scale) including checking gauge and complete instructions . . . Each,

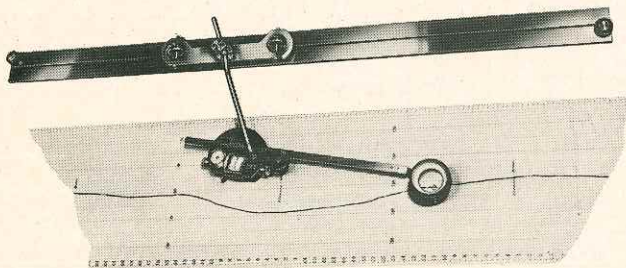
Stock No. 3651-10 Mfr. No. 236 Same but with metric scale . . . Each,

Stock No. 3651-20 Mfr. No. 232A Like 3651-00 except with fixed arm set at 0.010 sq. in. Each,

MEASUREMENT RANGES

	Stock No.	Mfr. No.	Tracer Arm Setting	Maximum Circle Diameter	Rectangle
WITH POLE OUTSIDE FIGURE	3651-00 3651-10 3651-20	236A 236 232A	20 10 Fixed	13" (33 cm.) 12" (30 cm.) 8" (20 cm.)	10" x 20" (25 x 50 cm.) 9" x 18" (22 x 45 cm.) 6¼" x 12½" (16 x 32 cm.)
WITH POLE INSIDE FIGURE	3651-00 3651-10 3651-20	236A 236 232A	20 10 Fixed	4¾" - 31" (12 - 80 cm.) 4¼" - 28" (11 - 70 cm.) 7½" - 23½" (19 - 60 cm.)	

Roller and Guide Track Unit



No. 3651-22 Roller and Guide Track Unit shown in use with No 3651 Planimeter.

Converts Nos. 3651-00, 3651-10 or 3651-20 to combination linear polar planimeters. Especially useful for measuring areas of recordings on charts.

SPECIFICATIONS:

Guide rail consists of a chromium-plated bar 28 inches (70 cm.) long and a two-wheel carriage complete with one orientable arm for connection to the planimeter.

Measurable Area:

Used with No. 3651-00 or 3651-10 Planimeters:

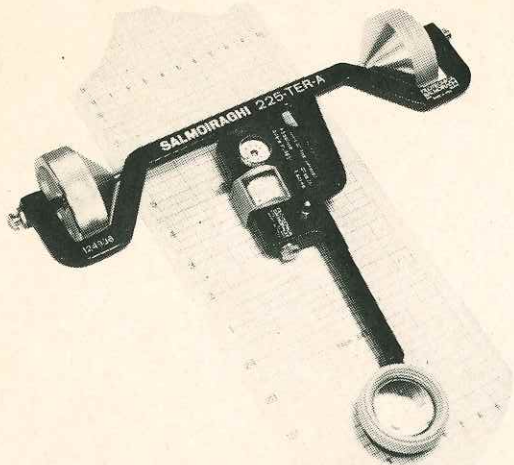
12 inches wide x 21 inches long
(30 x 52 cm.)

Used with No. 3651-20 Planimeter:

8 inches wide x 21 inches long
(20 x 52 cm.)

Stock No. 3651-22 Mfr. No. 240 Roller and Guide Track with 2-wheel carriage complete with one orientable arm for connection to the planimeter. In velvet-lined wood case. Weight 6½ lbs. (3 kg.) . . . Each,

All Salmoiraghi Planimeters are available in metric at the same price on special order.



3651-24 pictured with No. 3651-20
Planimeter attached

ROLLER CARRIAGE TRANSFORMATION UNIT

By the use of this roller carriage unit, planimeters 3651-00, 3651-10 and 3651-20 can be converted to linear planimeters for planimetric measuring of diagrams or greatly elongated areas. This transformation unit is composed of two steel rollers fitted on a shaft and connecting bar complete with a pin for coupling to the planimeter body.

SPECIFICATIONS:

Distance between carriage rollers: 7.2 inches (18 cm.).

Maximum dimensions of measurable area:

Length: No limit.

Width: 8" (20 cm.) with No. 3651-20; to 12" (30 cm.) with No. 3651-00.

Weight: Instrument with case 4 lbs. (1.8 Kg.).

Case: Special wood case, lined with velvet.

Stock No. 3651-24 Mfr. No. 225-Ter-A Roller Carriage only . Each,

HIGH PRECISION POLAR DISC PLANIMETER

Attainable accuracy of this instrument is 0.1%. The measuring wheel moves on a paper-covered metal disc which eliminates the possibility of unevenness of sheet surface if the wheel were to move on the actual sheet being measured. Movement is transmitted to the dial by a clutch coupling of two stainless steel surfaces which are precisely ground and have absolutely no play; and the wheel movement is simplified with a consequent improvement in the vernier unit.

SPECIFICATIONS:

Enlargement ratio: 2.5 to 1.

Vernier unit variable from .002 to .010 square inches.

Measurement capability:

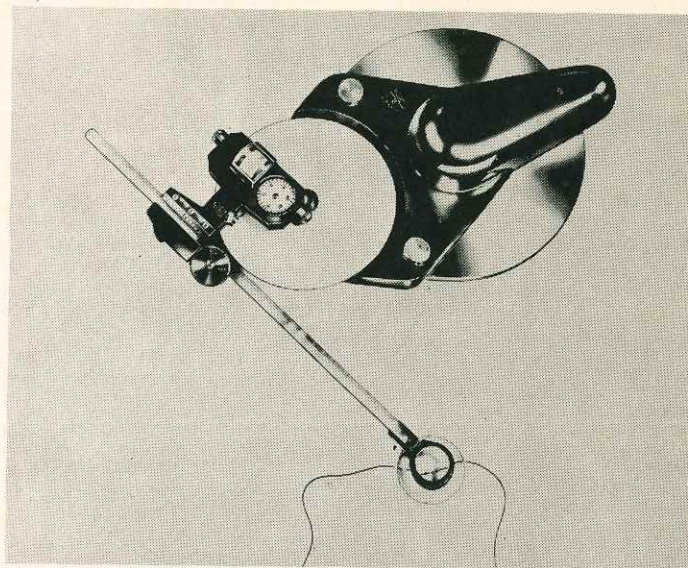
A. **With outer pole:** Any area within a circle having a maximum diameter of 9" (23 cm.) or a 7½" x 14" (19 x 36 cm.) rectangle.

B. **With inner pole:** Any area within a circle having a diameter from 13" to 31" (34 to 80 cm.).

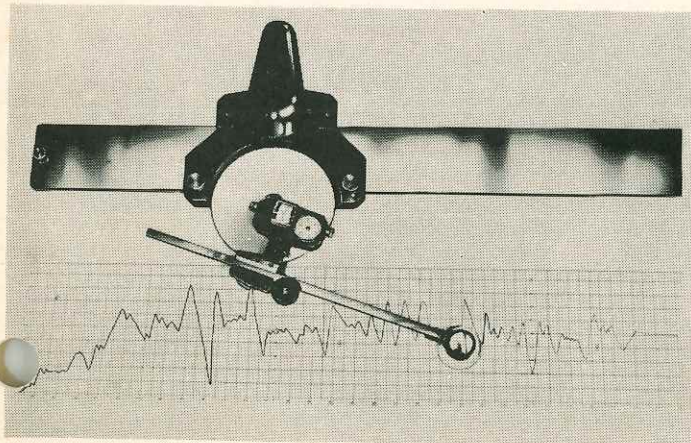
Weight: Instrument with case 11¾ lbs. (5.3 Kg.).

Case: The instrument is supplied in a cloth-lined wooden case.

Stock No. 3651-26 Mfr. No. 307-A Each,



3651-26



3651-28

HIGH PRECISION LINEAR DISC PLANIMETER

This linear version of the disc planimeter is designed for area measurement of band diagrams or other figures of unusual elongation. Attainable accuracy 0.1%.

The instrument moves smoothly in a guide of stainless steel ground to extreme precision, and 28 inches (70 cm.) long. It is held in position on the working surface by means of suitable anchor points.

SPECIFICATIONS:

Enlargement ratio: 5 to 1.

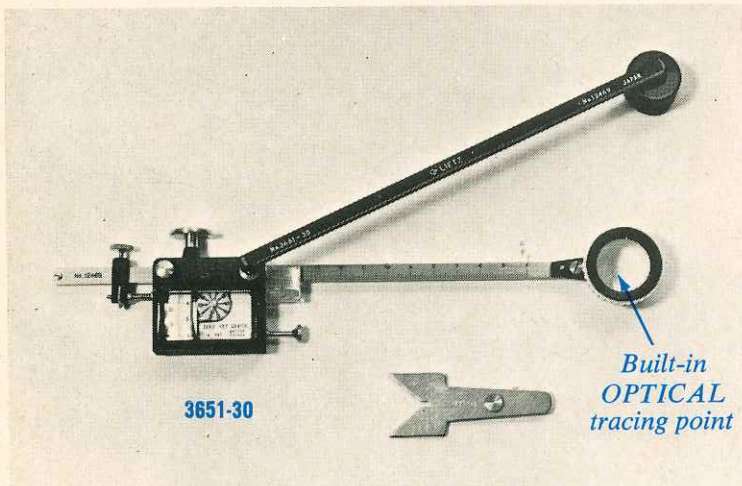
Vernier unit is variable from .001 to .005 square inches.

Maximum dimension of measurable area: 10 x 20 inches (25 x 50 cm.).

Weight: Instrument with case 2¼ lbs. (1 Kg.).

Case: The instrument is supplied in a velvet-lined wood case.

Stock No. 3651-28 Mfr. No. 308-A Each,



Measures regular or irregular areas such as are found on maps and plans. The Lietz Planimeter has instant zero return on recording dial, measuring wheel and vernier by fingertip control. Speed and accuracy are increased by the elimination of calculations from an existing setting and any handling of the measuring wheel is avoided. The measuring wheel and the registering dial are protected from dust and read through a magnifying cover. Freely rotating grip with wide area magnifying tracing lens and protected point insure accuracy and ease of control.

Adjustable tracer arm allows this planimeter to be set in any scale, English or Metric. It is a good quality instrument, and — at its modest price — an outstanding value.

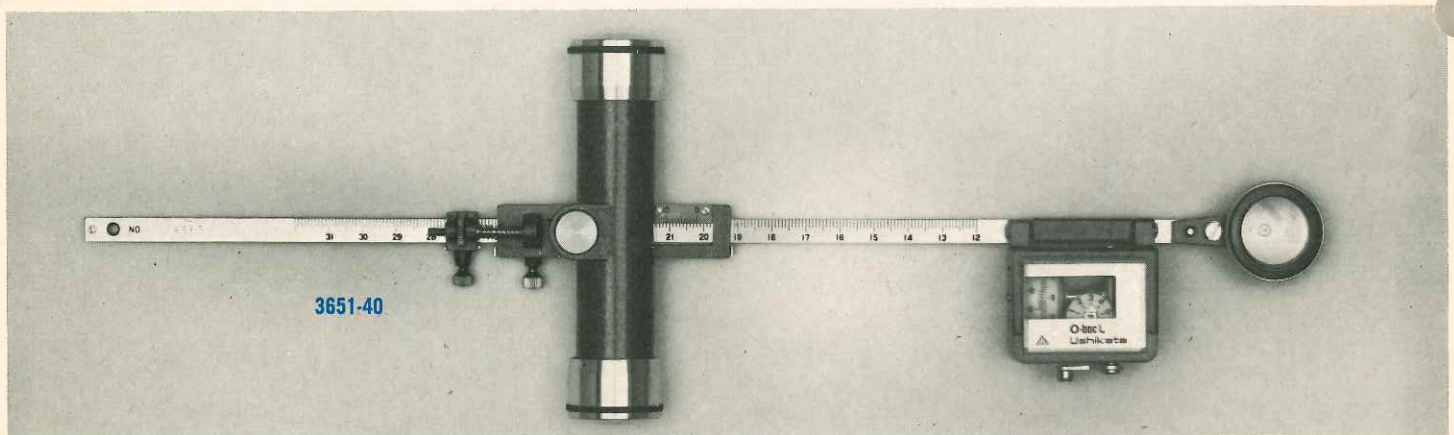
Measuring Ranges	Pole Outside	Pole Inside
Circle: Max. Dia.	9 $\frac{7}{8}$ " or 25cm	23 $\frac{3}{8}$ " or 60cm
Square: Max. length of side	8" or 20cm	19" or 48cm
Stock No. 3651-30	Instrument complete with case and instructions	
	Each,	

Combination Linear Optical Planimeters with zero set feature

Unique design roller planimeters measure regular or irregular areas. Twin, non-skid rollers, four inches apart, mounted in a weighted, pivoted bar provide good stability and precision. Wheels coated with a special slip-resistant material enable the instrument to function accurately on smooth or polished sur-

faces such as glass or film.

A single flick of a lever sets the dial wheel indicator to zero. Sturdy, shockproof wood case with padded blocks protects the integral wheel mechanism with its freely rotating grip and wide area magnifying tracing lens.



Adjustable Tracer Arm — for English or metric scale settings.

Measurable Area:
Length — no limit
Width — 16 $\frac{1}{2}$ in. (42 cm.) max.
Weight with case — 2.2 lbs. (1 kg.)

Stock No. 3651-40 Each

Fixed Tracer Arm — set at 0.01 sq. in.

Measurable Area:
Length — no limit
Width — 9 in. (23 cm.) max.
Weight with case — 1 $\frac{1}{2}$ lbs. (0.66 kg.)

Stock No. 3651-45 Each
(Available in metric units on special order)





8001-32



8001-70

Barometer — Altimeters

2-inch diameter barometer-altimeter in polished chrome, watch-type case has a precision-compensated mechanism. Dial is graduated to read altitude in feet (100 foot divisions) and barometric pressure scale to inches of mercury (intervals of 0.1 inches). Metric models graduated to read to 20 meter divisions with barometric pressure scale to millimeters of mercury (intervals of 2 mm.). With velvet-lined leather carrying cases.

Stock No.	Mfr. No.	Description	Each
8001-32	210C	0 to 12,000 foot range in 100 foot divisions	
8001-36	210D	0 to 16,000 foot range in 100 foot divisions	

Same as above except metric graduations.

8001-33	210CM	0 to 4,000 meter range in 20 meter divisions	
8001-37	210DM	0 to 5,000 meter range in 20 meter divisions	

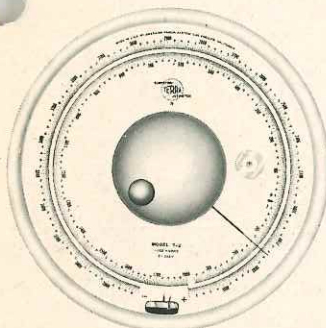
2 3/4 inch diameter barometer-altimeter in satin-finish, plated brass case. Foot model has dial graduated to read altitude in feet, barometric pressure in inches of mercury (to 0.1 inch) on outer scale, millibars (to 5 millibars) on inner scale.

Metric model has dial graduated to read altitude in meters, barometric pressure in millibars (to 2 millibars) on outer scale, millimeters of mercury (to 2 mm) on inner scale. With leather carrying case.

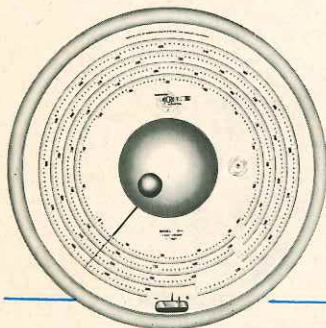
Stock No.	Description	Each
8001-70	0 to 15,000 feet in 100 foot divisions	Each,
8001-72	0 to 4,500 meters in 20 meter divisions	Each,

Paulin Surveying Altimeters

The Paulin System Altimeters give unequalled accuracy because of a new principle used to give readings. All friction-producing chains and levers are eliminated by using a nul (zero-gauging) principle so that altitude is indicated instantly without lag to intervals as close as one foot. Movements are fully temperature-compensated.



Stock No.	Mfrs. No.	TERRA SERIES	Each
All Terra Series instruments have non-glare, precision dials with etched faces. Five-inch diameter; weight with case, 2 lbs., 9 oz. These instruments are furnished with reinforced leather carrying case; magnifier; pocket thermometer.			
8003-02	T2	Range 4,350 feet (—350 to 4,000) in intervals of 2 feet	
8003-05	T5	Range 10,600 feet (—600 to 10,000) in intervals of 5 feet	
8003-10	T10	Range 15,000 feet (—500 to 14,500) in intervals of 10 feet	
8003-21	MT-1	Range 1,325 meters (—250 to 1,075) in intervals of 1 meter	
8003-22	MT-2	Range 3,260 meters (—260 to 3,000) in intervals of 2 meters	
8003-25	MT-5	Range 5,600 meters (—300 to 5,300) in intervals of 5 meters	



MICRO SERIES			
Non-glare, precision dials with etched faces. Micro Series instruments have 7-inch diameters; weight 4 lbs. with case. Furnished with reinforced leather carrying case; magnifier; and pocket thermometer.			
8003-51	M1	Range 6,000 feet (—1,000 to 5,000) in intervals of 1 foot	
8003-52	M2	Range 10,000 feet (0 to 10,000) in intervals of 2 feet	
8003-55	M5	Range 15,000 feet (0 to 15,000) in intervals of 5 feet	
8003-61	MM-1	Range 5,000 meters (0 to 5,000) in intervals of 1 meter	

MICRO ALTIMETER-BAROMETERS

These instruments are in the Micro Series but have a scale in both feet of altitude and inches of mercury pressure.

8003-82	PAB-2	Altimeter range —760 to 3,600 feet in intervals of 2 feet. Pressure range 26.30 to 30.85 inches Hg. Intervals of .002 in.	
8003-85	PAB-5	Altimeter range —900 to 9,700 feet in intervals of 5 feet. Pressure range 21 to 31 inches Hg. Intervals of .01 in.	

LIETZ offers COMPLETE surveying instrument maintenance service

Lietz surveying instruments will provide many, many years of service. However, like all precision instruments, they deserve regular care and maintenance.

No matter where you live in the United States, you are never far from authorized Lietz instrument repair service!

There are three Lietz factory repair service centers. In addition, many Lietz Authorized Distributors are equipped to offer precision repair and maintenance service on Lietz as well as practically all types and brands of surveying instruments.

Your surveying equipment can be one of the best investments you have ever made. After a productive life of 20 or even 40 years, a well-cared-for instrument will often be worth more than it cost new! Protect your investment.



Only work which is necessary and authorized will be performed and a detailed estimate will be furnished upon request.



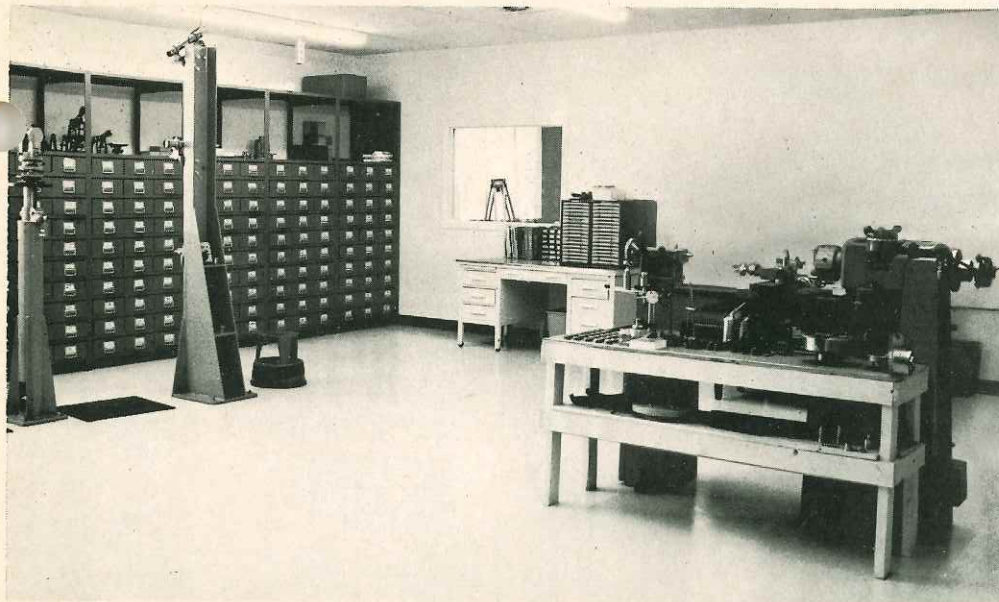
Main Office and Warehouse 1645 E. Del Amo Blvd. • Carson, California 90746
Phone (213) 537-0410 — (Los Angeles Area)



Eastern Office and Warehouse 835 Industrial Highway • Cinnaminson, NJ 08077
Phone (609) 786-0400 — (Philadelphia Area)



Northwest Regional Office 829 Cowan Road • Burlingame, California 94010
Phone (415) 697-6365 — (San Francisco Area)



The skills and experience of Lietz technicians are matched by the sophisticated instrumentation and tools they have at their disposal. **Left:** A portion of the shop area of one of our three Lietz repair facilities. Visible is a portion of the drawer sections which contain a complete stock of repair and replacement parts for all models of Lietz instruments. Not shown is the "clean room" which provides an air-conditioned



and dust-free environment for the cleaning and assembling of precise optical instruments with no fear of dirt or moisture particles. **Right:** The collimation of an instrument. Precise calibration, adjustment and alignment — as well as necessary repair and maintenance — will be performed on most any make of surveying instrument.



While capable of repairing even badly damaged instruments, much of the work handled by the Lietz Service Centers is routine cleaning and adjusting. Regular maintenance is done quickly, costs little, and is insurance against malfunction and serious time loss.

GUARANTEE

Lietz Surveying Instruments are fully guaranteed against defects in workmanship or materials for the life of the instruments. The experience and reputation of the Lietz Company in the manufacture of precision equipment since 1882 stand behind this guarantee.

ORDERING INFORMATION

The Lietz Company will gladly charge your purchases if you have an established account. To open an account, please include at least two trade references and the name of your bank.

If credit has not been established, please remit with your order an amount sufficient to cover the merchandise, shipping costs, any special export or packing charges, and sales tax where applicable. If cash is sent, the letter should be registered. Any excess amount will be promptly refunded or credited to you, as you direct.

Be sure all necessary details are included: catalog number, quantity, sizes, full descriptions. Omitting information may delay your order. Any preferences in method of shipment should be stated.

The Lietz customer order staff is equipped to give prompt personal service. Your orders and inquiries will always receive helpful, responsible handling. You will find it a pleasure to do business with Lietz.

SHIPPING INFORMATION

Our judgment as to the best way of shipping will be used unless you specify a preferred method.

Ownership of goods in transit passes to the purchaser at the time the transportation company signs pick-up receipt.

Should a shipment be lost or damaged in transit, the consignee must register a claim with the carrier. We will be glad to assist in your claim by providing necessary papers upon request. Parcel post shipments are insured by the Lietz Company and the fee is added to the invoice. For loss or damage on parcel post shipments, a written statement covering all details of loss or damage should be sent to Lietz. Replacement or repairs on parcel post shipments will then be made by Lietz.

MOST ORDERS SHIPPED THE DAY THEY ARE RECEIVED. Minimum order, \$10.00

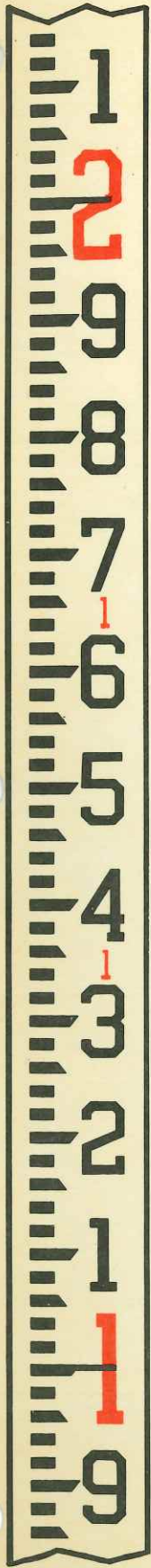
Prices and specifications contained in this catalog are subject to change without notice.

ALPHABETICAL INDEX

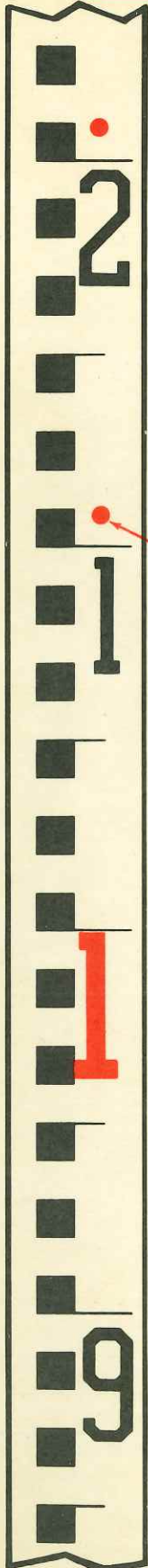
Abney Levels	39	Hook, Bush	50	Rod Ribbons	33
Accessories for Instruments	24	Illuminator, Instrument	24	Rod Targets	20, 30, 31
Adapter, Tribrach	26	Instrument Accessories	24	Rods, Builders	20, 32
Adapter, Tripod	22	Invar Tapes	56	Rods, Direct Elevation	29
Adjusting Pins	24	Jacob Staff	36, 42	Rods, Fiberglass	32
Alidade, Optical	25	Keel	47	Rods, Flexible Level	33
Altimeters	67	Kit, First Aid	49	Rods, Level	20, 28-33
Aluminum Leveling Rods	31	Kit, Snake Bite	49	Rods, Stadia	33
Aqua Locator	43	Kit, Tape Repair	60	Rolatape Measuring Wheels	55
Arc, Rhodes Reducing	35	Lead Wire	46	Rope, Surveying Fiberglass	59
Architects Scale Tape	57	Level Rods	20, 28-33	Rules, Folding	57
Arrows	60	Levels, Abney	39	Safety Hats	51
Automatic Levels	14-16, 18	Levels, Automatic	14-16, 18	Safety Vests	51
Axes	50	Levels, Builders	18-21	Scabbards, Plumb Bobs	48
Bags, Field	49	Levels, Engineers	14-17	Scales, Pocket	54
Bags, Prism	27	Levels, Hand	38-41	Schonstedt Magnetic Locators	43
Bags, Stake	49	Levels, Precise	17	Screwdriver, Instrument	24
Barometers	67	Levels, Tilting	12, 17	Scriber, Timber	47
Binders, Field Book	45	Lining Rods	34	Sheaths, Plumb Bob	48
Books, Field	44	Lufkin Tapes and Rules	56-60	Shiners, Surveyors	46
Books, Technical	45	Lumber Crayon	47	Sights, Target	25, 34, 48
Brass Nails	46	Machete	50	Sights, Ultra Site	34
Broad Hatchet	50	Magnetic Locators	43	Signs, Warning	51
Brunton-Type Compass	36	Magnifiers	61	Sledge	50
Brush, Instrument	24	Marker, Felt Tip	47	Slide Rules	54
Builders Instruments	18-21	Markers, Nail	46	Snake Bite Kits	49
Builders Rods	20, 32	Markers, Survey	46, 47	Spikes, Marking and Monument	46
Bulz-I Hand Levels	40	Marking Spikes	46	Spray Paint	47
Bush Hook	50	Measuring Tapes	56-60	Spring Balance	60
Case Tapes	58	Measuring Wheels	55	Stadia Circle	24
Chain, Surveyors	56	Metric Converters	54	Stadia Computer	54
Chicago Rod	31	Micrometer, Optical	24	Stadia Rods	33
Circular Slide Rule	54	Mining Transit	12	Stake Bags	49
Clamp Handle, Tape	60	Minvar Tapes	56	Stake Tacks	46
Compass, Accessory	24	Nails, Concrete, Masonry, Brass	46	Steel Tapes	56-58
Compass, Surveying	37, 38	North Seeking Gyro Attachment	9	Stereoscopes	62, 63
Computation Pads	45	Oil, Instrument	24	Survey Markers	46, 47
Computer, Stadia	54	Optical Micrometer	24	Support, Range Pole	34
Concrete Drill	50	Optical Plumbing Equipment	26	Surveying Compass	36, 37, 38
Concrete Nails	46	Optical Rangefinder	52, 53	Surveyors Umbrella	49
Cones, Traffic	51	Optical Transits	7, 12	Tacks, Stake	46
Contractors Instruments	18-21	P-K Nails	46	Tags, Surveyors	46
Converters, Metric	54	Pads, Computation	45	Tally Register	54
Convertible Transit-Level	19-21	Paint, Spray	47	Tape, Flagging	49
Copperweld Markers	47	Paulin Altimeters	67	Tapes, Measuring	56-60
Cord, Plumb Bob	48	Penta-Prism	42	Tape Reels	57
Counter, Tally	54	Philadelphia Rods	30	Tape Clamp Handle	60
Cover, Instrument	24	Pick, Prospecting	50	Tape Repair Kits	60
Crayon, Lumber	47	Pins, Adjusting	24	Tape Tension Handle	60
Cut and Fill Rod	29	Plane Table Equipment	25	Tape Thermometer	61
David White Instruments	20, 21	Planimeters	64-66	Targets, Plumb Bob	48
Diagonal Eyepiece	24	Plumb Bob Cord	48	Targets, Quik-Stik	48
Digital Theodolite	10	Plumb Bobs, Scabbards	48	Targets, Rod	20, 30, 31
Dip Needle	43	Pocket Calculator	54	Targets, Ultra-Site	34
Direct Elevation Rods	29	Pocket Scales	54	Text Books	45
Distance Measuring Accessories	26	Pocket Tapes	57	Theodolite, Digital	10
Double Center Theodolite	3-6	Pocket Thermometers	61	Theodolites	3-6, 10
Drill, Concrete	50	Pocket Transits	36	Thermometers	61
Dumpy Levels	17, 18	Poles, Range	34	Timber Scriber	47
Engineers Steel Tapes	56-58	Precise Level	17	Tins, Surveyors	46
Felt Tip Marker	47	Prism, Right Angle	42	Tools, Hand	50
Fiberglass Measuring Tapes	59	Prism, Retro	27	Topographic Hand Levels	38, 39
Fiberglass Leveling Rod	32	Prisms, Instrument	24	Traffic Safety Equipment	51
Field Bags	49	Prospecting Pick	50	Transit-Levels	19-21
Field Book Binders	45	Protractor, Alidade	36	Transit, Optical	7, 12
Field Books	44, 45	Psychrometer	61	Transit, Pocket	36
Field Book Sheets	45	Rangefinder	52, 53	Transits	7, 8, 11, 12, 19
First Aid Kit	49	Range Poles	34	Traverse Equipment	25
Flagging Dispenser	49	Range Pole Support	34	Traverse Sheets	45
Flagging Tape	49	Reading Glass for Transit	61	Tribrach with Optical Plummet	26
Flexible Rod Ribbons	33	Reel, Gammon	48	Tripod Parts	23
Frisco Rod	28	Reels for Steel Tapes	57	Tripods	21-23
Gad	50	Repair Kits, Steel Tapes	60	Tripods for Surveying Compass	36, 37
Gammon Reel	48	Repairs, Surveying Instruments	69	Ultra-Site Tripods, Heads, Targets	34
Government Manuals	45	Reticles	13	Umbrella, Surveyors	49
Gyro Attachment, North Seeking	9	Retro-Prisms	27	Valve Box Locator	43
Hammers	50	Rhodes Reducing Arc	35	Vests, Safety	51
Hand Levels	38-41	Ribbon, Flagging	49	Warning Sign	51
Hand Tools	50	Right Angle Prism	42	Weatherproof Field Book	45
Handle, Clamp	60	Rite-in-the-Rain Field Books	44	Wheels, Measuring	54
Handle, Tension	60	Rod, Cut and Fill	29	Wire, Lead	46
Hatchet	50	Rod Level	33	Wrench, Spanner, for Instrument	24
Highway Safety Equipment	51			Zenith Eyepiece Attachment	24
Holder, Lumber Crayon	47				

Level Rod Faces

Rod faces pictured are approximately one-half (57%) actual size.



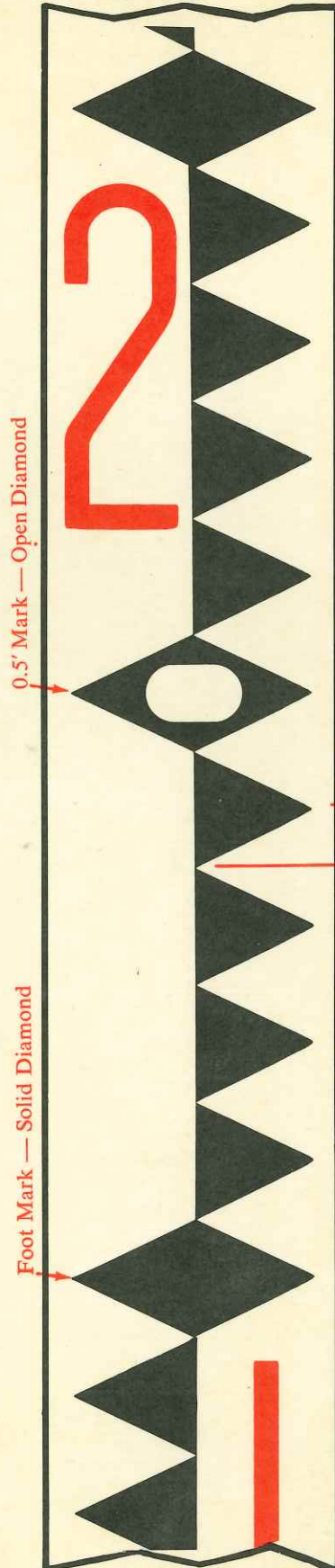
No. 1
Phila. & S.F.;
Feet, 10ths,
100ths



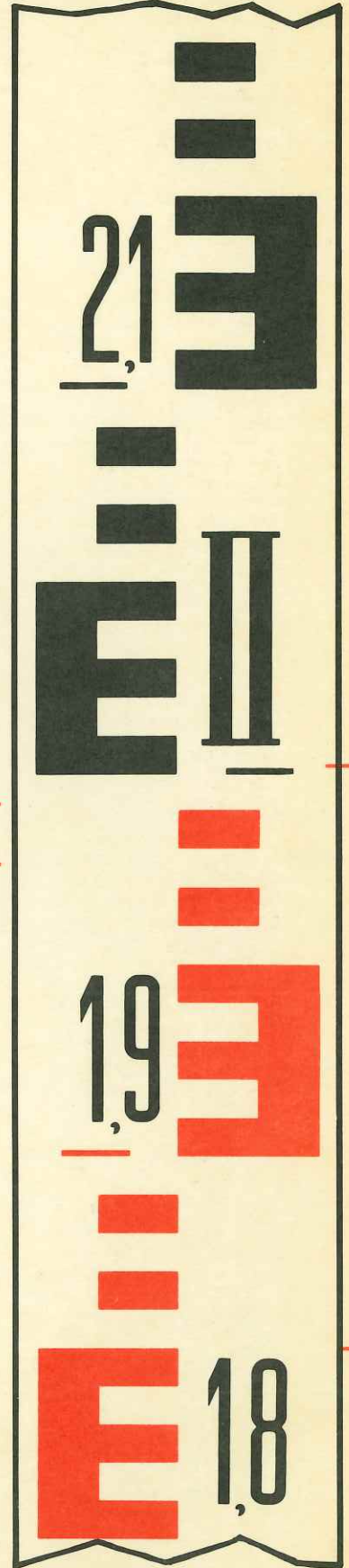
No. 2
Phila. & S.F.;
Meters, decimeters,
centimeters



No. 3
Direct Elevation;
Feet, 10ths,
100ths



No. 4
Stadia;
Feet, 10ths,
 $\frac{1}{2}$ 10ths



No. 5
Stadia;
Meters, decimeters,
centimeters



America's most complete Catalog of Surveying Instruments, Equipment and Supplies.
Everything for the Surveyor.

